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Organization of the Accounting Department of a Gas Company.

[Prepared by MR. R. C. JAMES, for the Mid-Year Conference, National Commercial Gas Association.]

The organization of the accounting department of a gas company must necessarily be based upon the number of consumers served. In the case of a small company, an efficient organization could be composed of a head bookkeeper only, with two or three clerks to attend to the records and detail. For the purposes of this article, however, a company is assumed to be operating in a territory of about 35,000 population, with 7,000 meters in service, and having 3,000 sundry sales accounts; a company of such size demanding a capable and well supervised office staff for the efficient operation of its accounting department. It is understood, of course, in outlining the organization for such a company, a considerable difference of opinion is to be expected, as in certain localities—due to the condition of the labor market—it might be possible to conduct the organization with greater or less units than given herein.

The manager would be the logical head of the department, directly responsible to the owners of the company for the handling of the accounts and finances, and all statements and reports of a financial nature would be prepared under the direction of the chief clerk for the scrutiny and approval of the manager. As more or less elasticity is allowed regarding the duties allotted to the various clerks enumerated, difficulty is met in compiling a standard of work to be covered by them, as it will be found that a clerk in one locality with a similar title to that of a clerk in another has functions to perform in no wise similar. This may be the result of greater aptitude of one clerk than another, or the variation may be simply a natural condition. For this reason the tabulation does not present an actual condition at any particular situation, but covers the routine affairs to be handled by a gas company, and the probable apportionment of the work. In all accounting organizations, constant vigilance and supervision must be exercised to thoroughly analyze the capabilities of the employees, and to see that each individual is adapted to the particular line of work assigned. It might also be noted that where efficient help is available, it is possible to so train the employees that they are capable of performing any or all duties in the office irrespective of their specific work. One advantage of training an office force along these lines is the non-interruption of the routine in the event of the absence or elimination of any of the employees. Below is given a skeleton outline of the organization, showing the relationship, followed by a brief summary of the duties, of the various employees:

Manager. { Chief Clerk and General Bookkeeper, { Cashier, Two Ledger Clerks, Order and Complaint Clerk, Stenographer and General Clerk, Collector, Two Meter Readers.

Chief Clerk and General Bookkeeper.—The Chief Clerk should have general supervision of the routine office work and the clerks; answer consumers' communications upon subjects pertaining to routine affairs; and scrutinize all statements and reports. He should be a man of executive ability, with a thorough knowledge of all the details carried on in the office, so that he will be alive to everything being done in the proper manner. He should know thoroughly the duties of each clerk, and how long it takes to perform the individual work assigned, and the time necessary to perform any of the office detail. This will enable him to intelligently supervise the workings of the office as a whole. In addition to supervising the office work, he should keep the general ledger, journal, cash books, accounts payable record and check books; check vouchers with invoices for correctness, compile monthly reports—consisting of journal entries, trial balance, accounts payable balance, disbursement sheet, classification of accounts payable, and pay rolls—and prepare any special cost reports or statements.

Cashier.—The Cashier should write up cash books daily, take care of petty cash and petty cash disbursement record, tabulate pay rolls, count out wages and place same in envelopes, receive all moneys for the company, and receipt bills, write gas bills during lax period of month, and list coupons for consumers and sundry sales bookkeepers.

Ledger Clerks.—To take care of 7,000 meters and 3,000 sundry sales accounts, together with the storeroom ledger, two clerks would be required. The work on the cousumers' ledgers would cover about the following; enter numbers, addresses, etc., of all meters set and removed, meters turned on and off, and meter readings; prepare all gas bills for delivery to consumers, check same with ledgers for accuracy, and post all payments. The position of consumers' bookkeeper is a very important one, and he should be thoroughly conversant with all the details having a bearing on his work. He should carefully watch every account on the ledgers, and if the consumption indicates a variation of say 25 per cent. on any meter, should see that the necessary steps are taken to have it investigated. He should have

a thorough knowledge of the consumptions of the various appliances sold by the company, in order to explain capably the possible causes for increases in consumers' bills in connection with complaints. He should also keep a close check on the outstanding accounts on the ledgers, and all accounts in arrears and doubtful of collection should be drawn to the attention of the proper authority, so that special efforts may be directed to their collection. A consumers' ledger bookkeeper, under ordinary circumstances, should be able to handle approximately 5,000 accounts.

The work on the sundry sales ledgers would be about as follows: Keep the sundry sales ledger and the sundry sales blotter, enter sales after orders have been filled, make up sundry sales bills for mailing or delivery, post payments received, and balance each month with general ledger balance of sundry sales.

A sundry sales bookkeeper should keep approximately 2,500 accounts. The clerks keeping the consumers' ledgers and sundry sales could take care of the storeroom record to the following extent: Check all invoices for materials received, make up monthly summary of credits of storeroom for issues therefrom, and balance storeroom record monthly with general ledger balance of storeroom account.

Order and Complaint Clerk.—The order and complaint clerk takes applications for meters, sees that consumer's credit is satisfactory, hears all complaints, takes orders for sundry materials when floor salesman is not provided, makes out all order and work cards for Distribution Department and attends to filing of all completed orders. The position of order and complaint clerk is another very important one in a gas company's office, and requires a man thoroughly conversant with the distribution end of the business, and also with the commercial department. It is also necessary that he be possessed of unlimited patience and tact to bear the burden of complaints, as he is the port of entry through which all orders and complaints are received.

Stenographer and General Clerk.—This employee should, in addition to his stenographic work, assist in the office generally, such as keeping meter record books, summary of meters and test cards. This enlarges his field of operation and makes him available for other clerical duties.

Collector.—The collector will collect delinquent bills for gas furnished and all sundry sales bills, and assist in delivering bills when necessary. It is assumed that one man could cover the territory of an office of this size, providing a discount rate was in force; in case the rate was on a flat basis two collectors would be required.

Meter Readers.—The meter readers should read all meters, lift money from prepayment meters and deliver the greater part of the bills. It should be the aim of every office to keep its work up daily, and not allow certain portions of it to accumulate until the end of the month. What is sometimes termed "continuous meter reading" has been found to be an aid in assisting not only the office force but the routine of a gas company generally, in that the readings are coming in all during the month, and the work of the office entering readings on the ledgers, sending out bills and collections, is spread over the entire period, instead of being bunched at the end of the month. This also helps the Distribution Department, as orders and complaints are usually received at the time bills are paid, and allows the distribution work to be spread over a longer period also.

No attempt has been made to go into details regarding books and blanks or methods of accomplishing the office work, as it is realized that a voluminous article would be necessary to treat this properly. It must be borne in mind that the suggested outline covers an office operating under the supervision of a commission, or controlled by a holding company, where the prescribed details are more elaborate than required by an independent company. The qualifications and personality of the clerks are not touched upon, this being fully covered in the paper, "Relations With Consumers," presented at the December, 1913, meeting of the Association.

Discussion.

Mr. A. P. Post differed with Mr. James on one point, namely, having storeroom records brought before the clerks who keep the consumers' ledgers, and did not think it was work that belongs in the upstairs part of the office, where the purely commercial records are kept. He thought they should follow closely the purchase work or the storeroom work proper.

Mr. James stated that he had tried both ways, having storeroom records kept in the storeroom, and having them kept in the office by either the cashier or one of the other clerks, and he found that very much better results were obtained by having the storeroom books balanced in the office with the general books.

Mr. W. H. Halsey stated that he did not think one bookkeeper could take care of 7,000 meter accounts, and that it would require a larger organization than was called for in the paper to take care of the detail work.

Mr. James cited one instance in his company where the sundry sales bookkeeper took care of 9,000 accounts, and had been doing it for several years. He thought the policy of keeping a man as long as possible and making a specialist of him and developing his efficiency, was the best course to pursue.

Chairman Pettes stated that he would like to have some one discuss the matter of continuous meter readings and called on Mr. F. B. Barnitz.

Mr. Barnitz stated that his company used the continuous reading system and had no discount period, but they attempted to have all bills dated to reach customers a number of days before the end of the month, in order to give them an opportunity to pay their bills in the same month.

Chairman Pettes asked how they handled the case of a man living in one part of the city and having a business house in another part of the city, so that he would receive both his bills at approximately the same time. Mr. Barnitz said they did not attempt to do this except in special instances, but that such a consumer could wait until he received the second bill, and he would not be urged to pay the bills until he had both.

Mr. Pettes asked whether there was any likelihood of the consumer being shut off for being delinquent if he waited to long in paying his bill. Mr. Barnitz said their present system allowed a man to run about two months, so there was not much chance of his receiving a shut-off notice, and that this method did not seem to interfere with collections or outstanding accounts.

Mr. George W. Thomson, said that his company had used continuous meter reading for a number of years and found it very successful; they had three distinct periods but they read continuously for thirty days; and in the case of a man's having two addresses they took care of the matter by holding one bill and sending the two together. The discount period is ten days after delivery, and not on any certain date. Approximately the discount dates are the 7th, 17th and 27th.

Mr. H. H. Newman stated that he did not see how any company having 7,000 customers could have only one man to handle the complaint desk without help.

Mr. Thomson stated that this matter could be handled as in Mr. James' paper, by having the other clerks dovetail in with this work.

Mr. Pettes's thought that the complaint counter should be over-manned rather than undermanned.

Mr. T. R. Beebe, referring to the continuous meter reading stated that under this system complaints or requests for information would be coming in all through the month as the bills are paid, instead of all at the end of the month, and that under this system the clerk would have ample time to care for these requests.

Mr. J. M. Brucker, stated that his company had used the continuous meter reading system for about ten years; that they have 32,000 accounts, with eight meter readers, and divide their city into 25 districts, each meter reader taking care of one-eighth of the work in the morning, finishing about one o'clock, and then in the afternoon doing clerical work in the office. Their system outlines a schedule for each day and month, and their customers are notified in advance of the day their meter will be read. Two cashiers handle these 32,000 accounts; they use six ledger bookkeepers, with probably 800 sundry postings a month, and he could not understand how one bookkeeper could handle 9,000 accounts.

Mr. Pettes asked whether his men did their own typewriting for removals and transfers, and Mr. Brucker stated that these were handled on the meter readers' hand books.

Mr. Pettes asked whether these were entered up on the ledgers by his men, and Mr. Brucker stated that this was the case, and that 95 per cent. of their customers pay within the discount period requiring only one collector to handle the outstanding accounts.

Mr. J. B. Myers asked if the sales department passed on credits. Mr. L. R. Dutton stated that the man at the head of the sales' department has charge of the credits.

Mr. James, in summing up, said that the continuous meter reading system was the secret of running an office economically, and that he found it caused a saving in office cost, per thousand, anywhere from 2 to 3 cents over the old method. He considered the position of col-

lector a very important one, and that a man should be a specialist along this line to take care of the job properly. In going from the old system to the continuous system, we must go slow, because if we drop in one month from the 20th to the 1st or 2d of the month, we cut our sales for that month. We have to drop back a day or two at a time so that it does not affect the sales.

Answering the suggestion that 7,000 accounts required two order clerks, one clerk should handle these and have time to spare under the continuous meter reading system. He found a satisfactory way was to send the bills out during the month and to allow the consumer until the 10th of the following month to pay his bill. Some of them would have 20 days and some 30 days.

Thermal Reactions in Carbureting Water Gas. Part II.—Theoretical.[1]

By M. C. Whitaker and W. F. Rittman.

In the design of an experimental apparatus for cracking oil in accordance with the theory set forth in Part I, it is necessary to provide accurate control over the three variables: temperature, pressure and concentration. The plan of research has been: (1) To keep pressure and concentration constant until the effect of changing temperature is understood; (2) to keep the temperature constant and change the total pressure on the system; (3) to hold both temperature and pressure constant and crack the oil in the presence of other gases in order to vary the concentrations.

The apparatus was designed to be of such dimensions and capacity as would indicate results which might be expected in commercial application of the principles. In completed form it covers a floor space 16 feet by 4 feet, and the oil feed cup at the top is 9 feet from the floor. With this equipment it is possible to maintain any temperature up to 1,000° C. within 5°, and any pressure from one thirtieth of an atmosphere to 3 atmospheres absolute.

The furnace body is 1¼ inch wrought iron pipe, 32 inches long. For a length of 18 inches the pipe is wrapped with No. 15 Nichrome resistance wire, 7 turns to the inch. Between the wrought iron pipe and resistance wire 5 layers of asbestos paper serve as insulation. In series with the nichrome wire of the furnace is a large rheostat, with graduated steps between 2½ and 9 amperes. An incandescent tell-tale lamp is connected across the binding posts of the furnace, to indicate when the current is on as well as to give a rough idea of the wattage in use. Both voltmeter and ammeter are connected with the circuit. (See Fig. 1.)

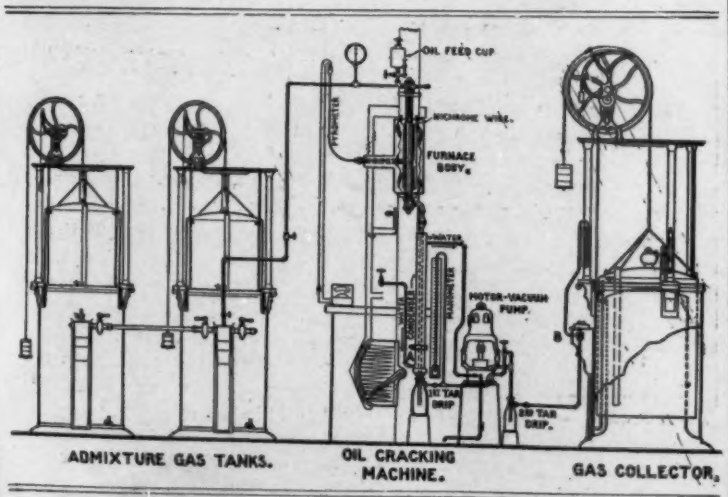

Fig. 1.—Apparatus for Oil Cracking and Gas Making.

The nichrome wire windings are enclosed in a 5 inch insulation of magnesia-asbestos pipe covering to minimize radiation. A ¼-inch wrought iron pipe is welded at right angles into the furnace body, as a container for the pyrometer point. This side tube is likewise insulated with asbestos and fitted with a stuffing box surrounding the pyrometer rod.

In order to vaporize the oil before it reaches the cracking zone, the upper part of the furnace tube is filled with ¼-inch steel balls, held in place by a thin post which runs vertically through the furnace supporting a perforated plate. The object of the steel balls is to spread the oil in thin films and facilitate vaporization, but not to serve as cracking service; in order to accomplish this they are kept at a safe height above the cracking zone. Lowering them into the cracking zone has a marked influence on the product obtained from the cracking process.

A sight feed oil cup of 1 quart capacity is joined by a ¼-inch elbow and nipple to a 1¼ × 1¼ × ¼ × ¼-inches cross which forms the upper end of the furnace body. The pressure in the oil cup is equalized through a small internal pipe which communicates with the furnace body below the point of oil discharge; thus, regardless of whether the apparatus is under increased or reduced pressure, the oil supply is always under a supply pressure equal to its own head.

For vacuum work the apparatus is connected with a mercury manometer calibrated in inches. A mechanical vacuum gauge is also placed at the top of the apparatus to indicate a free path in the cracking tube. In the course of the experiments under certain conditions, sufficient carbon was deposited to clog up the apparatus and show a considerable difference in the pressure between the two gauges. Such a condition, however, is limited to experiments involving high temperatures and pressures (atmospheric or greater), where the deposition of carbon is at its maximum. There is never any clogging under reduced pressures. For pressure work, the mercury column is disconnected and a mechanical pressure gauge substituted.

At the lower end the furnace body discharges through a Liebig type condenser into a tar drip for the collection of liquid condensates. The cooling water enters at the bottom of the condenser and on leaving continues through the jacket of the vacuum pump. The condenser pipe is offset from the furnace body rather than placed directly under it, so that the furnace may be cleaned by simply removing the lower plug and withdrawing the contents. It is thus possible to remove and weigh the deposited carbon from the furnace body after each run.

For vacuum work the tar drips are of glass, as this facilitates observation of the gas, as well as the nature and the rate of tar formation. It was soon found that the lighter condensates would continue through the vacuum pump because of the low pressure in the first tar drip. To collect the liquids drawn through, a second tar drip was placed beyond the vacuum pump. Upon reaching the second drip these lighter hydrocarbons condense, as the pressure is then approximately atmospheric. When working under one-thirtieth of an atmosphere it was found that only a small percentage of the hydrocarbons would collect in the first tar drip. For pressure work a steel tar collector was substituted.

Vacuum in the system is maintained by a May-Nelson 2-ring vacuum pump, regulated to maintain any desired vacuum down to one-thirtieth of an atmosphere.

For pressure work there is substituted an all metal tar collector, connecting pipe and release pressure valve, and the gas generated in the furnace body creates its own pressure, controlled by a release valve placed at the inlet to the gas collector. By regulating the release of this valve, the apparatus may be set to work under any pressure from atmospheric to 30 pounds per square inch above atmospheric. A pressure gauge in the discharge line is used as a check on the gauge near the oil feed.

The gas generated is collected in a 12 cubic feet capacity gas holder, graduated in tenths of a cubic foot. By multiplying the number of cubic feet by 28.32 the volume is reported in liters. To avoid relying upon natural diffusion for mixing the gases, the bell of the holder is fitted with an internal mechanical stirrer directly connected through a stuffing box to an electric motor on top of the bell.

The equipment also contains two 6 cubic foot capacity admixture tanks of the same design as the large holder. These serve as gas supply tanks when cracking oil in the presence of other gases, such as H_2, CO, or mixtures of the two. A ¼-inch steel pipe, fitted with needle control valves, connects these two tanks with the inlet end of the furnace body. The piping is so arranged as to connect any two of the three tanks.

Method of Making a Run.—When the apparatus is operated under vacuum the furnace body is first heated by the resistance coils to the desired temperature for cracking the oil into fixed gases. The oil is permitted to enter the upper part of the generating tube where it spreads over the steel balls and is vaporized. In the meantime, the vacuum pump has been set in operation and draws the oil vapors downward into a cracking zone, and they are immediately cracked into fixed gases and other products. These products, before opportunity is offered for polymerization or decomposition of the hydro-

1. Abridged from "Journal of Industrial and Engineering Chemistry."

carbon gases, are withdrawn by the vacuum pump from the cracking zone and their place taken by oil vapor from the vaporizing zone above. In this manner the hydrocarbon gases are withdrawn as quickly as they form. After they pass through the condenser and receiver for the removal of the condensable vapors, they are forwarded by way of the pump to the gas holder.

TABLE I.—*Typical Vacuum Run Record.—Oil Used*, 400 *cc.—Room Temperature*, 15° *C.—Barometer*, 756 *mm.*

Time.	Temp. °C.	Vacuum Inches.	Oil Feed Drops in 10 Sec.	Cu. Ft. Gas Observed.
11.43.....	900	29.00	..	....
12.00.....	903	28.50	24	....
12.15.....	905	28.00	26	2 16
12.30.....	895	28.75	23	3.01
12.45.....	892	28.75	21	3.76
1.00.....	895	28.50	24	4 86
1.30.....	895	28.50	26	6 86
1.45.....	895	28.50	25	7.76
2.00.....	895	28.75	17	8.36
2.07.....	Run ended		..	8.75

Corrected to standard conditions as follows:

$$8.75 \times \frac{273}{288} \times \frac{756}{760} \times 28.32 = 234 \text{ liters.}$$

Analysis of Products from Table I—Gas Analysis.

	Per Cent. by Vol.	Liters at std. Cond.
CO_2.....	0.1	.....
Ill.....	52.1	122.0
O_2.....	0.9	.....
CO.....	0.4	.....
CH_4.....	24.0	56 0
C_2H_6.....	1.3	3 0
H_2.....	17.3	40.0
N, (difference).....	3.9	.....
	100.0	.....

Carbon, 3 grams. "Tar" 60 cc. Sp. gr. 20° B.

After the gas in the holder is thoroughly mixed by the mechanical stirrer, three or four sampling tubes are filled for analysis. As a guide for all methods of gas analysis, Dennis's 1913 edition of "Gas Analysis," using the Hempel equipment, is followed. To determine the hydrogen in a mixture of hydrogen, methane and ethane, Hempel's fractional combustion method is used. All analyses are made in duplicate. In this work all conditions outside of temperature, pressure and concentration, were maintained as uniform as possible. Four hundred cc. of oil were used per run, fed at the rate of about 3 cc. per minute. The oil used is technically known as "150° (F.) water white oil;" its specific gravity at 15° C. is 0.7984; boiling point between 150° and 290° C.

Effect of Temperature Changes.—The experimental data on changes in temperature in the cracking of the oil, with pressure and concentration maintained constant, agree with the data recorded in the literature from the experiments of others. It is difficult to make accurate comparisons of two experiments conducted in different apparatus on account of the great variety of conditions involved.

TABLE II.—*Oil Used*, 400 *cc.—Gas Liters.*

Temp. °C.	Press.	Standard Conditions.	Carbon Grams.	Tar Cc.
650.....	atmos.	135	3	163
750.....	"	206	18	80
900.....	"	382	115	11

Analysis of Gas From Table II.

Temp. °C.	C_2H_6 Per Cent.	CH_4 Per Cent.	H_2 Per Cent.	Ill Per Cent.
650.....	10.2	33.7	9.1	43.6
750.....	4.9	41.1	19.2	30.6
900.....	None.	46.7	38.6	13.1

However, the general results obtained at different temperatures by by different experimenters are comparable. As the temperature increases, the quantity of valuable gas from a given amount of oil increases to a maximum, after which the gaseous hydrocarbons rapidly decrease and the deposited carbon increases. The quantity of tar decreases, but this is due to a dissociation of the hydrocarbons and cannot be construed favorably. Upon subjecting the oil to temperatures of 650°, 750° and 900° C., under atmospheric pressure, the results are as shown in Table II.

Effect of Increased Pressure on Gaseous Reactions.—It seems reasonable to expect that a high pressure will assist materially in condensing three volumes of acetylene into one volume of benzene: $3C_2H_2 \rightleftarrows C_6H_6$. On the other hand, it seems that, under a high pressure, it will be considerably more difficult for one volume of oil vapor to break up or expand to many volumes of gas than under reduced pressure.

In the system

OIL (Few volumes) $\rightleftarrows$ GAS (Many volumes) $\rightleftarrows$ TAR (Few volumes)

one would expect that the application of high pressure would increase the difficulty of generating gas, and after the gas is generated it would make easier the condensation reaction which proceed to the tar stage. Since the unsaturated hydrocarbons, ethylene and acetylene, polymerize most readily, increased pressure should preferably condense them with the formation of tar compounds. In addition to the direct influence of pressure, it may be assumed that when working under increased pressure the gaseous hydrocarbons are subjected to the influence of heat for a longer time, which further tends towards the formation of heavy condensation products at the expense of the illuminants. The series of experimental results in Table III appears to justify these conclusions.

TABLE III.—*Oil Used*, 400 *cc.*

Temp. °C.	Pressure Absolute Lbs.	Gas Liters.	Carbon Grams.	Tar Cc.
650	45	145	8	133
750.....	45	194	26	87
900.....	45	310	165	9

Analysis of Gas from Table III.

Temp. °C.	C_2H_6 Per Cent.	CH_4 Per Cent.	H_2 Per Cent.	Ill Per Cent.
650.....	11.5	45.1	9.3	30.5
750.....	6.1	56.6	17.5	15.5
900.....	None	41.6	50.0	5.0

The yields of gaseous hydrocarbons are lower than those shown in Table II, which were obtained at the same temperatures, and likewise the maximum yield is lower than the maximum obtained under atmospheric pressure.

Effect of Diminished Pressure on Gaseous Reactions.—By referring to the oil-gas-tar system cited above, it becomes evident that a high vacuum would favor the increase in volume due to cracking the oil into gas and at the same time withdraw the gas from the heat zone before it could form tar. The effects of this reduced pressure can best be observed from the results of the experiments in Table IV.

TABLE IV.—*Oil Used*, 400 *cc.*

Temp. °C.	Pressure Absolute.	Gas Liters.	Carbon Grams.	"Tar" Cc.
750.....	1/20 to 1/30 atoms.	146	1	153
850.....	1/20 to 1/30 atoms.	211	3	100
900.....	1/20 to 1/30 atoms.	234	3	60
950.....	1/20 to 1/30 atoms.	235	12	58

Analysis of Gas from Table No. IV.

Temp. °C.	C_2H_6 Per Cent.	CH_4 Per Cent.	H_2 Per Cent.	Ill Per Cents.
750.....	....	....	12.5	56.1
850.....	3.4	20.5	15.6	52.9
900.....	1 4	24.0	17.3	52.1
950.....	Trace	27.0	20.8	46.9

This striking difference in end products, due to diminished pressure, seems to have been overlooked, perhaps because for the first few pounds per square inch vaccuum the increase is not marked.

Influence of Concentration Changes on Gaseous Reactions.—The present investigation has merely opened this field. It has been established that oil cracked in an atmosphere of a gas, such as hydrogen, which reacts chemically with the end products of the cracking process, will yield products which are not analogous to those resulting from a physical mixture of the two gases. Not only does the mere presence of the admixed gas influence the end products, but as is to be expected from the theoretical consideration, the quantity of the admixture gas is influential.

To study the various gases and their quantitative relation will require much further experimental work. The results of preliminary study indicate that there is a vital relationship between the resulting gases in a cracking process and the atmosphere in which the oil is cracked. The relationship is likely to be of commercial significance in water gas carburization. The quantity of CO and H_2 admixed per

gallon of oil cracked, is an important factor, just as the temperature and the pressure have been shown to be important. L. B. Jones, in his improved all oil water gas process, recognizes the importance of adding an "active gas" to the cracking zone but considers the effect of the presence of the admixed gas to be catalytic. Hempel found that by cracking oil in the presence of hydrogen not only did none of the hydrogen split off from the hydrocarbons, but part of the admixed hydrogen actually combined for the formation and preservation of hydrocarbons. On the other hand, on the basis of a single experiment reported, he maintains that the presence of CO in the cracking zone is similar to the presence of a neutral gas, and is without material influence on the end products obtained from the oil. As to the hydrogen, the results of this research agree with the observations of both Hempel and Jones. The quantity and quality of gas per cc. of oil increase, and qualitative results, show that the tar and deposited carbon decrease.

TABLE V.

Temp. °C.	Pressure Absolute Lbs.	H_2 Admixed L.	Liters. C_2H_4	CH_4	Ill	H_2	Shrinkage in H_2 Liters
750.....	15.0	358	15.4	125.0	70.6	308	50
800.....	15.0	412	18.0	116.0	83.3	335	77
750.....	0.75	400	9.5	52.0	112.0	381	19
810.....	0.75	413		86.5	140.0	378	35
860.....	0.75	388		99.5	133.0	350	38
900.....	0.75	292		92.0	120.0	272	20
960.....	0.75	382		95.0	113.0	348	34

From these results it appears that a greater percentage of the admixed hydrogen enters into a combination to form saturated hydrocarbons when the cracking process is carried out under atmospheric pressure than is the case under greatly reduced pressure. The per centage increase in yield of the illuminants when cracking process is carried out under reduced pressure in the presence of hydrogen, is about as great, however, as is the percentage increase in illuminants when the reaction is carried out under atmospheric pressure.

If changing temperature and pressure have a marked influence on the quantity and quality of gaseous hydrocarbons obtained from cracking petroleum, one should expect simultaneous changes in the condensable hydrocarbons, which differ from the permanent gaseous hydrocarbons only in that they are liquid or solid at ordinary tem peratures. There should be equilibrium between all hydrocarbons of a series at the high temperatures prevailing in the furnace where practically all the hydrocarbons are gaseous. That the end products should contain ethylene and then suddenly jump to hexene is not to be expected, any more than that the hydrocarbons in coal tar would jump from benzene to naphthalene or antracene. In industrial practice the "illuminants" are usually said to consist of 75 per cent. ethylene and 25 per cent. benzene vapor. When the gas made by cracking oil in the apparatus under one-thirtieth pressure of an atmosphere pressure absolute is passed over palladium in the presence of an excess of hydrogen, over 90 per cent. of the illuminants are converted into saturated hydrocarbons, principally ethane, indicating that the illuminants contain but little, if any, benzene vapor. If the gas contains no benzene, it is only logical to believe that the condensable hydrocarbons contain no aromatic hydrocarbons, It is further found that the vaccuum tar will combine with 1.82 sp. gr. sulphuric acid. It has a low specific gravity, and on permitting the higher boiling point fractions to stand, no napthalene or anthracene separate out. Tars resulting from cracking oil in carbureting blue water gas under atmospheric pressure, contain quantities of benzene, toluene and other aromatic hydrocarbons in sufficent amounts to be of commercial importance. In view of these facts, there is justification for the statement that tars which result from cracking pretroleum under low pressures are different from those which result from cracking under atmospheric or higher pressure. Instead of benzene, toluene and other aromatic hydrocarbons, the vacuum tar contains members of the more unsaturated hydrocarbon series. The composition of these tars is now the subject of a further investigation.

Summary.—In the theoretical discussion on the influence of diminished pressure on oil gas manufacture, it was pointed out that one should expect an increase in the yield of gaseous hydrocarbons from a given amount of oil by reducing the pressure below atmospheric. This increase should reach a maximum as the absolute zero of pressure is approached. The correctness of this is shown by results recorded in Tables IV. and VI. Not only are the gaseous hydrocarbon yields greatly increased, but the deposited carbon is practically eliminated, and there is much less gaseous hydrogen produced than in the product obtained at the same temperatures under higher pressure. It was pointed out that increasing the total pressure under which the oil is cracked to several atmospheres, will decrease the gaseous hydrocarbon yields from a given amount of oil. Experimental results, shown in Table III, have proven this correct.

It was pointed out that varying the pressure on the system would enable one to better control the quantity and quality of "tar" obtained than at present where all tar is made under atmospheric pressure. Experimental results indicate considerable flexibility.

It has further been established that the end products resulting from cracking oil in an atmosphere of a gas such as H_2, which reacts chemically with the end products of the cracking, are a function of both the camposition and the quantity of the gas admixed, per Table V.

Experiments, Table IV., have proven that it is possible to "crack" oil at a temperature of 900° C. without depositing more carbon than 1 per cent. by weight of the oil used.

TABLE VI.—*Summary of Gas Tables.*—(*All based on 400 cc. oil and calculated to 0° C., and 760 mm. pressure*).

Temp. °C.	Pressure, Lbs. per Sq. In.	Gas L.	Carbon G.	Tar Cc.	C_2H_4 L.	CH_4 L.	H_2 L.	Ill. L.
Atmospheric Pressure Group (See Table II).								
650.....	15.0	135	3	163	13.8	45.5	12.1	58.8
750.....	15.0	206	18	80	10.15	84.5	39.6	63 0
900.....	15.0	382	115	11	Trace	178.1	148.2	50.0
High Pressure Group (See Table III.)								
650.....	45.0	145	8	133	16.7	65.2	13.1	44 3
750.....	45.0	194	26	87	11.8	110.0	33.9	30.1
900.....	45.0	310	165	9	None	128.9	155.0	15.5
Low Pressure Group (See Table I. and IV.)								
750.....	0.75	146	1	153	....	....	18.3	82.0
850.....	0.75	211	3	100	7.16	43.2	32.9	111 5
900.....	0.75	234	3	60	3.0	56.0	40.0	122.0
950.....	0.75	235	12	58	Trace	63.4	48.8	110.0
Admixed Gas Group (See Table V.)		Hydrogen Admixed.		Hpdrogen Shrinkage.				
750.....	15.0	358	..	50	15.4	125.0	308.0	70 6
800.....	15.0	412	..	77	18.0	116.0	335.0	83.2
750	1.0	400	..	19	9.5	52.0	381.0	112.0
810.....	1.0	413	..	35	....	86.5	378.0	140.0
860.....	1.0	388	..	38	....	99.5	350.0	133.0
900.....	1.0	292	..	20	....	92.0	272,0	120.0
950.....	1.0	382	..	34	....	95.0	348.0	113.0

Through a proper consideration of equilibrium and mass action conditions under various degrees of temperature and pressure, much can be expected in gaseous reactions. It soon becomes evident that the single stage method wherin endothermic and exothermic, expansion and contraction reactions are combined in a single apparatus, is open to question.

Inter-Locking Attachment for Holder Valves.[1]

By MR. JAMES HEWETT.

The attachment was devised for use in connection with valves working in series; the objective being to render impossible the occurrence of such mistakes as closing the only open inlet or outlet valve of gasholders, opening the outlet-valve of a producer-gas plant prior to closing the valve on the service of a town's gas distributory system, or *vice versa*.

Each valve of the series to be inter-locked is provided with a key of special design, and an attachment so arranged that the withdrawal of the key is impossible unless the valve is in a certain condition—open or shut, according to whether it is desired to ensure that one or more of the valves shall be open or shut. The keys for any series are interchangeable, but different from the keys for other series of valves in the same works.

The inter-locking is effected by the withdrawal, and placing in a position of security, of one or more of the keys, thus rendering them inaccessible to the men controlling the working of the valves. Take, for example, gasholder inlet-valves each provided with a special key and an attachment arranged so that the valve is open when the key is removable. One key is withdrawn from use. Necessarily the valve from which the key is extracted is open; and before it can be closed another valve must be open or opened, so that a key is

1. *Journal of Gas Lighting*, London.

available to effect the operation, and so on. While assuring that one valve is always open, the working of the valves is not otherwise affected. Any or all of the valves may be open, or any or all with the exception of one (not restricted to any particular valve of the series) may be shut. If it is essential that more than one valve shall be open at a time, keys corresponding in number to the minimum number of valves to be open are withdrawn from use.

On the other hand, it may be required that not more than one of a series of valves is open at a time, as in the case of a dual supply of town's and producer gas. To meet this requirement, the attachment is arranged so that the valve is shut when the key is removable. One key is withdrawn from use; and the valve from which it was taken is shut. The second valve may be open or shut, but has to be in the latter position before the key can be employed to manipulate the other valve.

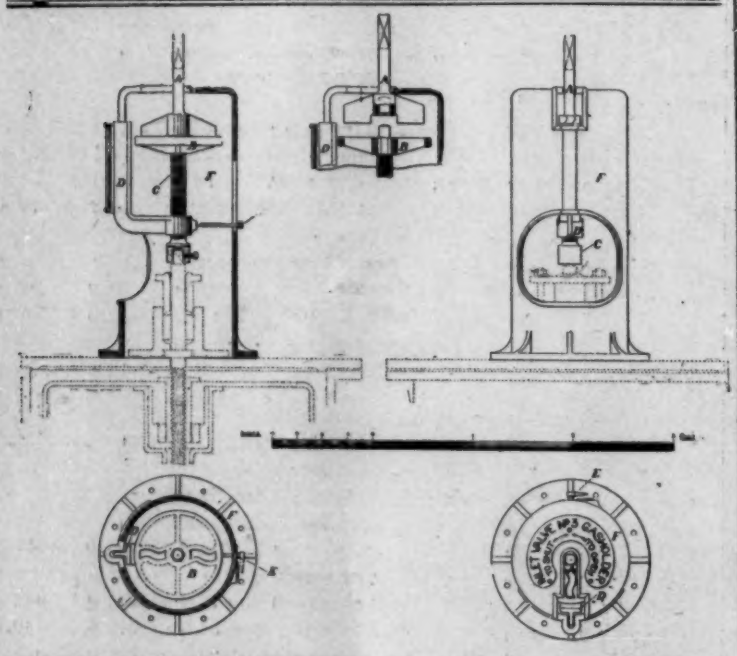

Fig. 1.

The attachment is made in a variety of forms; that illustrated being the pattern used for the inlet-valves of the holders at the Birmingham Gas Works. The case, with glass front, hanging on the wall of the meter-house, and containing the key witdrawn from one of the valves, to effect the interlocking of the series, and also the notice relating to the use of this key in cases of necessity, and the penalty attached to its wrongful removal, are illustrated in Fig 2.

The constitutive parts of the attachment are as follows: The key, *A*, consists of a bell-mouthed annular boss, with radiating arms of special design, projecting below the underside of the boss, and a circular shank terminating in a square to take a standard double-handed wrench. The key-carrier, *B*, is a circular casting flat on the top, with a polyhedral hole at the centre, and radial slots corresponding in shape, number, and position with the projecting portions of the arms of the key The locking bar, *D*, comprises an internally screwed boss and a rectangular arm of T-section, with the table of the same width as the diameter of the boss of the key. The spindle, *C*, is threaded to accord with the screwing of the locking bar, shaped at one end for a sliding and driving fit in the holes of the key and and the key-carrier, respectively, and arranged at the other extremity to suit the top of the valve spindle or gear wheel and bearing. In the case of new valves or existing valves, when, owing to wear and tear, the renewal of the valve spindle is inevitable, provided the attachment is applicable without the interposition of gearing, the spindle, *C*, and the valve spindle are embodied in one piece. The casing, *F*, is a hollow cylindrical casting, with a flat top enclosing the key carrier, *B*, the spindle, *C*, and the locking bar, *D*. An aperture, capable of passing the lower portion of the key, is arranged in the cylinder, immediately below the top of the casing; and a slot in the latter of a width slightly in excess of the diameter of the shank of the key, leads from the aperture to the center of the casing. Below the aperture, a groove is formed along the cylinder, in the direction of its axis, to partly surround the stem of the locking bar, *D*, and an opening provides means of access to the stuffing box of the valve spindle, ect.

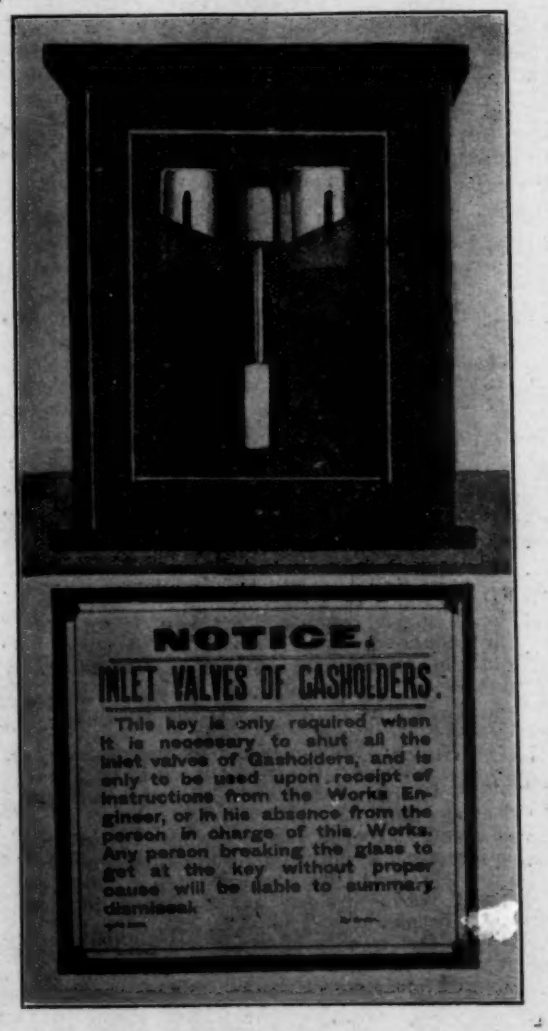
NOTICE.
INLET VALVES OF GASHOLDERS.
This key is only required when it is necessary to shut all the inlet valves of Gasholders, and is only to be used upon receipt of instructions from the Works Engineer, or in his absence from the person in charge of this Works. Any person breaking the glass to get at the key without proper cause will be liable to summary dismissal.

Fig. 2.

Fig. 3.

In the illustrations, the valve is shown in the open position. To close a valve, the key is inserted through the aperture in the casing, *F*, (as shown in Fig. 3), placed upon the protruding portion of spindle, *C*, and rotated. When the projections of the radiating arms of the key coincide with the slots in the key carrier, *B*, the key falls into position. A wrench is then applied to the top of the key, and the valve closed. Coincidently with this operation, the locking bar,

D, rises; and this reducing the size of the aperture in the casing, *F*, the key, *A*, cannot be removed from the casing, *F*, until the valve is re-opened and the locking bar, *D*, resumes its original position.

The system, though simple, is effective, and may be relied upon to satisfactorily fulfil the purposes for which it is intended. The attachments have been in daily use for upwards of 9 years, and close observation has failed to reveal any shortcomings.

The Store Room.

[Written by MR. GEO. G. KUHN, for the Iowa District Gas Association.]

The subject of this paper is to give a complete description of the operation of a storeroom, as a necessity, as well as from a standpoint of economy and efficiency. The writer will endeavor to set forth only in a general way the features of stores accounting that require special attention, and make no attempt to cover all details, as these are always subject to a certain extent to local conditions and facilities for handling stores, as well as the nature of the reports required by an accounting department.

The results to be obtained from an economic and an efficient stores system are three-fold, First: A thorough check of all materials received, that assure that proper value is received for moneys paid out. Second: Correct classification of charges for all material drawn out for operating and construction. Third: That proper charges may be made for material sold or contracted for by sales department.

First, I will give you an outline of our method of handling stores material from the time it is requisitioned until final disposition is made of it. When any material is required for the operating, sales or construction department, a requisition is made out on the purchasing department, either by the storekeeper, or a foreman or superintendent of the operating or construction departments. If the requisition is made out by any other than the storekeeper, a copy of the requisition is forwarded to him with the proper disbursement charges noted thereon. In all cases the requisition must be approved by the general manager, or other proper official of the company, before being sent to the purchasing department. The storekeeper is furnished with a copy of all orders for material purchased, regardless of whether it was requisitioned by the storekeeper or by a foreman, or by the superintendent. The copies of the orders received by the storekeeper from the purchasing department are of two colors; one, yellow, indicates to the storekeeper that it covers material requisitioned by himself; the other, green, indicates that it was requisitioned by some other party. One copy of the order is also sent to whoever makes out the requisition, thereby indicating to him that his requisition has been acted upon by the purchasing department, and if the order is incorrect in any way he will at once advise the department. The copies of the orders in every case show the requisition number and by whom requisitioned. The storekeeper then indicates on the copy of the requisition retained by him the order number covering it and files it for future reference. We attach hereto a copy of the requisition blank used by the Peoples Light Company, marked "Exhibit One."

As all the material purchased is not to be received at the general storeroom, the purchasing department endeavors to have packages marked with destination and order number. In this way our drayman, who handles the freight, can deliver the material with least possible expense. In some cases, however, packages are not properly marked and it is necessary to deliver the material to the general storeroom, where it is unpacked and its proper destination determined.

When material is received by the storekeeper he makes a record on a loose leaf blank, which gives a record of the order number on which it was purchased, the railroad by which it was received, the bill number, and the amount of freight and drayage; the quantity and net cost of same after deducting discount and adding freight, and the folio number of stock ledger to which it is afterwards posted, as well as voucher number which covers payment.

When the material is not received at the general storeroom, but delivered to the gas plant, pipe yard, etc., the foreman or superintendent in charge reports receipt to the storekeeper on a material receiving blank, on which he indicates the requisition and order number covering the material. The storekeeper then makes the record of this material, in his receiving record book, as he does of material received for storeroom stock.

All invoices after they have been approved for price by the purchasing agent are sent to the storekeeper for check and receipt. If the material is to be carried in the "stores account" he so indicates on the invoice; but if the material is not to be carried in stock, but charged direct he charges the same to the account indicated on the copy of the requisition furnished him when the material was first requisitioned for purchase. The storekeeper for future reference makes a notation on the receiving sheet in the column marked "Charged direct." The invoices in either case, are then forwarded to the general accounting department, whose duty it is to check all extensions and voucher them, charging such items to the "stores account" as have been O.K'd by the storekeeper. When material is received and has been checked by the storekeeper for quantity and quality, it is put in the proper bins or racks provided, on which appears a tag showing the bin number as well as the stock ledger number or folio.

The storekeeping month is from the 21st to the 20th inclusive. All material received during the month is posted from the receiving book to the stock cards or ledger sheets. As soon as possible after the close of the fiscal month the accounting department furnishes the storekeeper the vouchers covering all items charged to the stores' account during the month.

The storekeeper then checks these vouchers with his receiving book, indicating the voucher number in the proper column. He then posts from his receiving book to his stock ledger all material charged against his account by the general office during the month. It sometimes happens that invoices may be O.K'd by the storekeeper but are not vouchered in the month in which they were received. The storekeeper does not post these items to his stock ledger until they have been vouchered and charged against his account. The reason for this is that the stock ledger sheets are balanced monthly with the general books, and we only include such items in our monthly stock ledger balance as have been charged against the storeroom on the general books of the company.

This gives you a complete record of our method of handling material from the time it is requisitioned until it becomes part of the storeroom stock. In addition to material charged against the stores account, we also charge a great deal of labor against it from the pay-roll. We will not discuss this item now as it will be brought up in connection with the handling of work orders.

I will now endeavor to give you an outline of the method of the distribution of material issued by the storekeeper and the method of handling the charges. It is the policy of our company on all work done, whether on a contract basis such as house piping, installation of fixtures, setting of gas stoves, or appliances, etc., as well as certain maintenance and construction work, to issue what we designate as a "work order." All work orders are issued by the party in charge of our gas sales room. At the time the work order is made out, a card, showing the work order number and the account to be charged, is issued and sent to the storekeeper. The use of this card will be taken up in connection with the handling of the work orders. When the material is issued from the storeroom, the party taking it is required to sign a storeroom requisition, which shows the work order number to which the material is to be charged, and ledger sheet number from bin tag. Each day as the timekeeper makes out his pay-roll for that day, all labor chargeable to work orders is charged by him against the stores account. He immediately makes storeroom requisitions for the labor charged to each work order for the amount of labor on that job. The total sum of the labor charged against the stores account each day must balance with the total sum of the requisition signed by the timekeeper and delivered to the storekeeper. These requisitions signed by the timekeeper are retained by the storekeeper for future reference the same as the requisitions for material issued by him. When the work orders are issued they are distributed to the proper departments for completion. As soon as the work on an order has been completed the workman indicates thereon the pipe and fittings used, and returns the work order to his foreman. This notation is necessary in our case, due to the fact that we are so situated that the storekeeper cannot look after the issuing of pipe, as it is not kept in the general storeroom. The foreman sends the storekeeper a requisition for the pipe used on the job and returns the completed work order to the party who issued same, who after making proper record of the return of the work order, forwards it to the storeroom. If the work order covers work at a stipulated price for the job, it is so noted on the work order. If the work order covers a "Time and Material" job, the charging price is determined by the storekeeper in accordance with the method established by our company. As the requisitions are received by the storekeeper from time

(*Continued on page* 10.)

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NEW YORK, MONDAY, JULY 6, 1914.

BRIEFLY TOLD.

CENTRAL DEVELOPMENT BUREAU, N. C. G. A.—The recently created Central Development Bureau of the National Commercial Gas Association has begun active work and is sending blanks to the gas companies of the country asking for statistical information which will be kept at the headquarters of the Association, available to any member or duly accredited representative of a company. It is felt that this information should be of great value in questions of public policy and development. At the same time the companies are asked to supply operating data and test data covering uses of gas that they feel may be of particular value to others. The Bureau is collecting, sorting and filing such data, as well as the catalogs and data books of manufacturers in all branches. These files are at the disposal of any member of the Association and all are urged to make use of them. If you have an unusual or knotty problem upon which you would like information, write association headquarters and the information available will be forwarded, giving the names and addresses of manufacturers making the necessary appliances, how similar work is done in other localities, and details as to cost of installation, fuel consumption, labor cost, etc., etc. Companies and individuals are earnestly requested to contribute information in their possession, which would help to make this file more useful, and all are again urged to call upon the Association without hesitation, for assistance. The Bureau is considering the desirability of the creation of a Central Testing Laboratory to be operated under the direction of the Association, which will afford to all companies alike, an unbiased and economical source of information covering gas appliances of every description. There is at the present time no such generally available laboratory in existence, and it is believed that the establishment of a central institution would fill a very real need. It is further hoped that the Bureau may eventually be in a position to act as a clearing house for inventions and new ideas, and possibly to undertake actual research itself. The Chairman would be particularly glad to receive suggestions and opinions. The Committee consists of the following:

Messrs. J. E. J. Mayer, Peoples Gas Light and Coke Co., Chicago; F. J. Rutledge, The U. G. I. Co., Philadelphia; C. E. Paige, Malden, Mass.; John L. Conover, Jr., Public Service Gas Co., Newark, N. J.; John L. Meyfarth, Denver Gas and Electric Co., Denver, Col.; A. A. Treadway, Detroit City Gas Co., Detroit, Mich.; H. E. G. Watson, Consumers Gas Co., Toronto, Canada; R. C. Ware, Boston Consolidated Gas Co., Boston, Mass., Chairman.

COMBINED CITY BUREAU OF PUBLIC UTILITIES RESEARCH.—Mayor Blankenburg, of Philadelphia, has sent to the Mayors of all the principal American cities, a letter in which he says:

"The City of Philadelphia is preparing to bring a case before the Public Service Commission, of Pennsylvania, in which that body will be asked to pass upon a proper schedule of rates for electric light and power. In the course of our investigations and review of hearings on this subject, we have come to realize that the side of the people has seldom, if ever, been adequately presented before other public service commissions, while the interests of the utility companies are presented and argued by the best informed and most able men in the country. * * *

"To meet this situation it has been suggested that there should be formed a Bureau of Public Utilities Research which shall equip itself to give the cities the same able assistance which the public utilities companies' associations give to them, thus in effect constituting an offensive and defensive alliance among the cities similar to that existing among public utility corporations.

"To this end we are preparing to form a permanent organization of this character. I am writing to you to ascertain your interests in this matter and to ask whether you would be represented at a nation-wide conference of city officials to be held in this city in the autumn to discuss the various phases of public utility problems as affecting the people and how they may best be dealt with."

"This means," it is added, "that consumers of gas, water and electricity, and patrons of street cars and other utilities are to have a friend at court in the future."

The plan, it is announced, "already has the support of Mayor Mitchel, of New York; Mayor Harrison, of Chicago; Mayor Baker, of Cleveland, and Mayor Shroyer, of Dayton.

"The Mayors of the three largest American cities are interested in seeing that rates and service for public utilities shall hereafter be based on actual cost of providing and furnishing such services, and on the actual value, used and useful for such purposes, and not on the power of a monopoly to extort what rates it will, and not on a capitalization that represents merely the selling power of utility promoters. The organization has already been started and a conference called to discuss the vital factors in these problems."

SEVENTY-CENT GAS FOR BOSTON.—In the event of the passage of the 70-cent gas bill, now before the Massachusetts Legislature, the city of Boston, excluding East Boston, Charlestown and Hyde Park districts, will have the lowest price for gas of any municipality in that state, a position now held by Lynn, with an average price of 72.9 cents per 1,000 cubic feet. It has always been supposed that the Boston Consolidated Gas Company was immune from legislative attack and forced reduction in gas prices under the sliding scale act. This has been the belief for the past 8 years, but the Attorney-General now gives an opinion that no contract actually exists between the commonwealth and the gas company, and that the price may be lawfully changed without the assent of the company. The bill, now before the House, in its original form, changed the sliding scale act by 4 amendments as follows:

Act to take effect July 1, 1916.
Standard price of gas to be 70 cents.
Standard rate of dividend not over 7 per cent.
Company not to have right to increase dividend by 1 per cent. for each 5 cents reduction in price as now provided.

This bill, on being passed to third reading, was changed to preserve the "sliding scale" feature of its 1906 act, and makes the standard price 80 cents (instead of 90), dividend 7 per cent., and allows an increase of 1 per cent. in dividends for every 5-cent. decrease in price from 80 cents.

INTERPRETATING THE MICHIGAN COMPENSATION LAW.—In the hearing on the claim of Mrs. Nora Simmonds against the Michigan Light Company, for damages under the employer's act, held the 23d ult., before J. A. Kennedy, of the State Industrial Accident Board, and Emory J. Wood and E. I. Isbell as arbitrators, the arbitrators reached a verdict that the petitioner was entitled under the act to ½ of her husband's wages, $2.25 per day, for 300 weeks. Mr. Isbell did not agree with Mr. Kennedy and Mr. Wood, he being willing to allow her some compensation, but not this amount, but under the statute she would be entitled to this $3,025 or nothing. Attorney Westerman, who appeared for the Michigan Light Company, sucessor

to the Jackson Gas Company, announced an appeal would be taken to the full Industrial Accident Board, and later, if necessary, to the Supreme Court. The husband of the claimant was Frank Simonds, 45 years old, and on the 24th of April, while unloading pipe, he hurt his right hand. Counsel for the Company conceded he was injured, but contended it was a very minor injury and that his death was due to diabetes and not to the injury. He worked 5 or 6 days after he was hurt, but did not do very much, and after seeing a doctor went to the hospital at the latter's request. He died there May 4.

GAS DEVELOPMENT IN CENTRAL CALIFORNIA.—The report for 1913 just issued by the Pacific Gas and Electric Company, gives figures of the growth of their gas business. Gas is also being used in the company's territory in an increasing degree for industrial purposes. Among these may be mentioned the manufacture of cans, varnishes, barrels, etc., the operation of linotype and laundry machines, the roasting of coffee and the manufacture of jewelry and smelting of precious metals. One consumer of this class uses more than 20,000,000 cubic feet of gas per annum. The company manufactures its gas exclusively from crude oil under a process developed by its own staff. The chief characteristics of the process are the ease and economy with which the oil is handled as compared with coal, coke, etc., the almost entire absence of residuals and waste materials, the flexible capacity of the works and, consequent upon these, the comparative economy in labor employed at the works.

Gas Department Statistics.

Year.	Number of Gas Plants.	Total Daily Capacity of Generators, Cubic Feet.	Miles of Gas Mains.	Number of Gas Street Lamps.
1906.....	14	16,440,000	1,147.26	3,607
1907.....	14	27,640,000	1,269.62	4,491
1908.....	14	33,980,000	1,329.53	4,922
1909.....	14	34,280,000	1,447.03	4,956
1910.....	14	34,680,000	1,634.21	5,499
1911..	16	34,680,000	1,917.71	8,342
1912.....	17	44,710,000	2,201.00	8,442
1913.....	17	44,710,000	2,374.18	8,924

ILLUMINATING ENGINEERING SOCIETY, COMMITTEE CHAIRMEN MEETING.—The first meeting of the Committee Chairmen who will conduct the next annual convention of the I. E. S., in Cleveland, O., from Sept. 21st to 25th, inclusive, was held at Hotel Statler, Cleveland, on Wednesday, June 17th, where the General Chairman gave a luncheon to the Committee Chairmen in attendance. Those present at the meeting included:

Mr. W. M. Skiff, Chairman: National Lamp Works, Cleveland.

Mr. A. J. Brown, Secretary: National Lamp Works, Cleveland.

Mr. H. B. Dates, Chairman Attendance Committee: Case School of Applied Science.

Mr. S. G. Hibben, Pittsburg Section: Macbeth Evans Glass Co., Pittsburg, Pa.

Mr. F. R. Hutchinson, Chairman Publicity Committee: East Ohio Gas Company, Cleveland.

Dr. E. P. Hyde, Chairman Reception Committee: National Lamp Works, Cleveland.

Mr. C. L. Law, New York Section: New York Edison Company, New York city.

Mr. C. L. McKinstry, Chairman Entertainment Committee: Erner Electric Company, Cleveland.

Mr. H. N. Sibbald, Master of Transportation: National Lamp Works, Cleveland.

Mr. A. G. Summerell, Chairman Hotel Committee: National Carbon Company, Cleveland.

For various reasons the following committee members were unable to attend:

Mr. G. S. Barrows, Philadelphia Section: United Gas Improvement Company, Philadelphia, Pa.

Mr. J. W. Cowles, New England Section: Boston Edison Company, Boston, Mass.

Mr. C. A. Luther, Chicago Section: Peoples Gas Light and Coke Company, Chicago, Ills.

Mr. Mathias Turner, Chairman Finance Committee: Cleveland Illuminating Company, Cleveland.

Plans were discussed for the handling of details connected with the work of each committee and the Chairmen's duties clearly outlined. Each Chairman was asked to appoint as many more members on his committee as he deemed necessary, and it was suggested and agreed that a meeting of each of the various committees was to be called and work assigned each committeeman, so that the Committee Chairmen might meet again on Monday, July 6th, to further discuss the work and report on that done. Further detailed announcement will be made from time to time concerning hotel headquarters, entertainment features and papers to be read.

PUBLIC UTILITY PROBLEMS.—"Public Utility Problems" was the subject of an address by Thomas N. McCarter, President of the Public Service Corporation of New Jersey, delivered before the Finance Forum of the West Side Young Men's Christian Association in New York. He said in part: "At the outset I want to register my protest against one seemingly well recognized theory of to-day, and that is that no man who is in my line of business is worth listening to; that no such man can be honest in his expression of opinion; that he is tarred with a corporate stick; that he is a sort of leprous animal allowed to be loose, but who, for the public good, should be confined; that no man who is at the head of a large corporation, especialy one concerned with public utilities, can have an open mind about the questions that affect the country. I deny the proposition in toto. I know the men who are engaged in the public utility business of this country, and I do not believe there is a more loyal, patriotic or honest set of men in any employment than is to be found shaping and directing the policy of these great public utilities that have sprung up within the last 30 or 40 years. The fundamentals, as I call them, with regard to the operation of public utilities are four:

"First, the regulation of public utilities.

"Second, the rate of return that should be allowed to public utilities.

"Third, the character of future franchises that should be granted to new public utilities or to existing public utilities for new territory.

"Fourth, the question of municipal ownership of public utilities.

"With regard to the regulation of public utilities, both radicals and conservatives, agree, so far as I know, upon the principle of regulation, and yet I say that with certain misgivings. The two public service commissions of New York are spending, in the exercise of their functions, about $3,000,000 a year of the taxpayers' money. It is very well to have somebody to curb these so-called rapacious corporations; it is very well to see that watered securities are not issued; but it would take 60 millions of securities at 5 per cent. interest to be wiped out before these commissions have paid their freight. Three million dollars a year is a large sum to spend for an idea.

"It is well enough for the commissions to have power to require adequate service and rates, but when it comes to giving these men plenary powers to substitute their judgment for that of the Board of Directors constituted by the stockholders who have invested their money in the enterprise, it is fatal to the success of the properties. It is the worst kind of municipal ownership, for it is municipal ownership without financial responsibility.

"Our theory of government, national and State, has thus far proved a great success, but I think most sober-minded men will agree that our theory of municipal government has proved a failure. Certain it is that the calibre of men in municipal government in this country is entirely different from the standard of either State or national government. The causes for this are many. Corruption, graft, universal suffrage, indifference of the intelligent classes to the right of suffrage, and a thousand and one things have put the wrong men in municipal offices. I am not making a personal attack upon anyone, but am speaking generally of the history of municipal government in this country."

"It seems to me that municipal government thus constituted has about enough to do already. Schools, libraries, sewers, water supply, paving, museums, parks, playgrounds, health, fire and police departments. Isn't that about enough for the character of municipal governments we have in this country? Would you think it wise to add to those burdens telephones, telegraphs, gas, electric light and power, street railways, subways, and all the rest of it?

"Think of the stupendous amount of money that the municipalities would have to pay to take over these properties on any scheme of valuation. And when it comes to purchasing these properties under condemnation, the Supreme Court of the United States has put itself on record as holding that the whole assets of a company, good-will, franchise value, going value, and all, must be paid for, whether they were granted without compensation or not. Think of the billions of dollars the municipalities would have to pay! As your chairman referred to my company—somewhere between 250 and 300 millions for one company doing business in a comparatively small State. Think of the straining of municipal credit, think of the raising of the interest rate to municipalities for all purposes. A sorry day for this republic when it starts upon any such theory of government."

AN ADDITION.—The article on "Gas Rate Making," by Mr. Henry I. Lea, published in the JOURNAL of June 22d, was prepared for the Davenport meeting of the Iowa District Gas Association, and should have been so headed.

(Continued from page 7.)

to time, they are filled numerically according to the number of the work order which they cover, and as soon as the completed work order is received by the storekeeper he attaches all the requisitions for labor and material he has on file, and from these requisitions determines the billing price. In order that the billing department can render an itemized bill to the customer, and to check any errors which may occur in the stores department extensions, the material and labor furnished in connection with the work order is then listed and priced on the cost price card (referred to above) which shows the cost price in one column and the billing price in the opposite column. This card which is filed away with the completed work order shows at once whether the job was a profitable one for the company. After the billing price has been determined by the storekeeper, the work orders are stamped by the storekeeper for credit to the proper accounts, such as "House piping," "Contracting gas supplies," "Ranges," etc., and forwarded to the accounting department to be billed to the consumer and credit given the account indicated. The requisitions covering the material and labor used on the job in connection with the work order are stamped for charge against the same accounts, at cost price and retained by the storekeeper for use in making his monthly report.

This method of handling work orders refers only to such as are chargeable to our contracting accounts. Work orders covering work chargeable to our company accounts are handled in the same way, until they arrive completed in the storeroom, then they are stamped "Storeroom Charge," and are sent, together with the cost price card, to the accounting department and filed. The work order will at any time give the cost of the job which it covers. The requisitions for labor and material used in connection with the company work orders are retained by the storekeeper, for use in making out his monthly report. Our primary reason for covering all jobs with work orders is to be able to know just what each completed job has cost, and to compare it with the estimate made at the time the job was authorized. Each party having anything to do with the work orders endeavors to pass them on as rapidly as possible, to the department for which they are intended, with a list of the orders, as we have found this necessary to determine in what department a work order is lost, when such a thing occurs. While it is not within the duties of our storekeeping department, we might state that the auditing department checks the work orders issued, with the customer's charge ledger, to ascertain that all work orders are finally charged to the customer.

We now come to the final distribution of the labor and material issued by the storekeeper for use in arriving at the proper amounts to be charged to the different operating and construction accounts or contracting accounts. We use a monthly summary sheet marked, ruled into columns for each day of the fiscal month. In order to arrive at the amounts chargeable to each account we take one or more sheets for each account, and to these are posted, by days, from the requisitions, such material and time as has been issued to the accounts during the month. These sheets are then totaled and each sheet shows the amount chargeable to the account posted on it. The stock ledger sheets are credited for all disbursements made during the month, and a recapitulation is then made up in the form of a report and forwarded to the accounting department which charges the contracting accounts, construction accounts, or operating accounts, with the amounts specified on the storekeeper's monthly report. The accounting department crediting the stores department on their books for the total amount of labor and material covered by the report.

We formerly had a good deal of trouble taking care of our fittings stock. When the yearly inventory was taken we would have a very large shortage. We have, to a great extent, eliminated this difficulty in the following manner: We have found it advisable to carry a "storage" and a "work stock." The storage stock is kept in a separate room under lock and key, and the fittings issued by the storekeeper to the work stock or to the bins as needed. The work stock is inventoried on the 20th of each month, and in this way we are able to determine the amount of fittings used each month. The distribution of the charges for the fittings used each month is divided as follows: All fittings 1 inch and smaller 4 per cent. to house piping, 40 per cent. to stove runs, 20 per cent. to service and setting meters. Fittings larger than 1 inch: 90 per cent. to services and 10 per cent. to maintenance of service and mains. We have found from experience that the above distribution is about right. We do not take requisitions for the fittings as used, but all fittings used on work orders are reported and listed on same in order that the cost price of the job can be determined. Another feature of our storekeeping system which we believe is important is the method of handling the sales of gas supplies, etc., in the sales room. Our retail sales department is charged by the storeroom for all supplies issued to it, and as the material is sold, whether for cash or charge, it is reported by the sales department on a triplicate recording Globe register. The original of this slip is retained by the sales department and the duplicate goes to the cashier, who takes a note of the cash sales and makes charges for the material sold on charge accounts, crediting "Gas Supplies Sales" for the total sales made. The triplicate remains in the machine and is taken out by the storekeeper each day, who gives the sales department credit for the sales recorded on the slip. The sales room stock is adjusted each month with the stock charged against it by the storeroom. In order to avoid shortages in the sales room the party in charge there has all his supplies listed on a sheet so that he can take a daily inventory and in this manner catch any shortages and be able to account for any which he may find.

To some of our members the stores system outlined above may seem to contain a great deal of "red tape," and make an expense not warranted by the results obtained: and it seems to the writer that it is common opinion that the storeroom is of little importance, and that it is only necessary to have a good strong man capable of handling heavy boxes, etc., in charge of a storeroom with the possible additional characteristic of honesty attached to him. This is a serious mistake, as we find that brains is more of a storeroom requisite than muscle. If you are going to have a storeroom it is necessary to have one in charge who thoroughly understands the accounting system of the company, and who is able to properly classify his charges from the stores. The storeroom in my opinion is one of the most important departments of a gas company, and there are many reasons why the stores accounting department of every gas company, whether large or small, should have some well defined system in use. First: An inefficient or improperly handled storeroom cannot only cause great financial loss, but also a great many complaints among its customers, due to improper priced bills being sent to them. As most gas users take a special pleasure in explaining to their neighbors the troubles they have with the company, and as the public, to a certain extent, is suspicious of all bills received from a gas company, too great care cannot be taken to have properly rendered bills sent to your customers. Second: By the coming of State commissions many companies are likely to be called on to furnish details of the cost of operation and construction, and unless they can show their charges for these are correct, they may be placed in an embarrassing position in an attempt to prove the charges shown on their books. Third: Another reason for a well organized stores system is the ability at any time to determine without great delay the value of your stores account, and this is especially true where the accounts of a company are examined by public accountants, who not only have to be shown that you have the material on hand, as represented by your stock ledger, but also that the charges made against construction and operation have been properly classified.

While the writer does not care to say that as complete a system as outlined in this paper is necessary in the operation of a small company, every company, large or small, should keep its stores records in such shape as to be able to report its disbursements from month to month, in whatever manner required by the accounting department. The old method of charging out the shortage on the annual inventory is at its best only a hit and miss proposition, as the disbursements have to be made to a large extent by guess, and I believe that it will not be many years until charges based on such methods will not be recognized or tolerated by the various State and Government commissions to whom you are required to report. Should you at some future time wish to issue bonds for construction expenditures already made, you will undoubtedly find that prospective purchasers will require an audit of your construction accounts to ascertain that all charges against your construction accounts are properly handled. If your stores account has been properly kept, you will be able to show without doubt that your charges are correct. In conclusion, the writer cannot too strongly impress upon the members the necessity of a well organized storekeeping system whether the company be a large or small one.

[Specimens of 9 forms referred to were shown.]

THE Linton (Ind.) Gas Company is making extensive improvements and additions to its plant, preparatory to laying mains to and through the village of Dugger and other settlements in that neighborhood.

Principles of Illumination Applied to the Home.

[Lecture by ROBERT F. PIERCE, delivered before the Indiana Gas Association.]

So many considerations enter into the lighting of the home that only the barest outline may be presented in the time at our disposal. Generally speaking there are four angles from which one may view the problem:

First.—From the standpoint of immediate utility—the provision of sufficient light in various portions of each room to enable the occupant to engage in activities to which the room is devoted—reading in the library; relaxing one's self in the "den;" sewing in the sewing-room, etc.

Second.—From the point of view of the comfort and health of the eyes. Illumination may be ample for any particular purpose and even excellent to the casual observer, yet the light may be so distributed that serious eye-strain inevitably follows the continued occupancy of the room.

Third.—From the artistic standpoint—the effect of color, direction and intensity of illumination upon the aesthetic effect of the interior as a whole. The mere choosing of fixtures and glassware in harmony with the furnishings and interior arrangement, by no means insures a result satisfactory to the sense of beauty. Every shadow and every high light contributes to the making or marring of the final result.

Fourth.—From the economic point of view. When we consider that pleasant surroundings contribute so much to mental and physical efficiency, it would appear that even from dollars and cents considerations economy should come last in importance. True as this undoubtedly is, it by no means follows that a wasteful and expensive installation is comfortable and artistic, nor that the most economical one may not also be the best from every other point of view.

On the other hand, lighting systems which have been carelessly planned are usually extremely wasteful, hard upon the eyes and lacking in artistic merit. I will attempt to demonstrate the influence of the more important factors concerning the comfortable, economical and effective illumination of small interiors.

Fortunately, the application of the principles involved requires only the exercise of a little judgment, and very often a very small expenditure of money will enable the resourceful householder to make wonderfully striking improvements in his lighting system, and at ths same time effect a reduction in his lighting expense. Usually, however, the present cost of lighting the home, is not only not excessive, but far below that entailed by any other domestic service of equal importance, and the average householder is less concerned with reducing his lighting bills than with improving his lighting service. A little attention to apparently insignificant details, the intelligent application of the principles, which will later be demonstrated, will enable any one at a trifling expense to make improvements in the lighting of his home that will pay large dividends in conserved health and eyesight, comfort and satisfaction.

What constitutes pleasant, comfortable, satisfactory illumination? We may obtain at least a partial answer in our own everyday experience with out-of-doors illumination, if we inspect it with the purpose of determining these particular features. If we take a book out-of-doors and concentrate our attention upon the printed page, we notice first of all that on a bright sunny day we can read with much greater comfort in the shade than in the sun. There is obviously such a thing as too much illumination. Furthermore, a passing cloud that greatly reduces the illumination on the printed page, does not decrease our ability to read with comfort, provided the changes from high to low illumination do not occur too rapidly and too frequently. It is plain that the eye is able to adapt itself to a wide range in intensities of illumination, provided the changes are sufficiently gradual. After the sun sinks below the horizon, we are still able to read with comfort, but the gathering twilight gradually reduces the illumination to a point below which reading is accomplished only with a strain upon the eyes that eventually becomes painful, and finally the printed characters become undecipherable. It is evident, therefore, that over a wide range the eye cannot appreciate the considerable changes, provided they take place gradually, but that both above and below this range eye-strain results and impairment of vision ensues.

Thus far we have considered only the effects of different degrees of uniform illumination over a small field upon which the eye is directed and attention concentrated. It happens, however, that but a small portion of our hours at home are devoted to activities in which these conditions prevail. We have usually in our field of view a considerable expanse of illuminated surface, which is characterized by great differences in brightness. In fact, leaving color out of the question, it is these differences in brightness upon which our appreciation of external objects depends. If we step out-doors on a bright sunny day we notice the sharp pronounced shadows on buildings, trees and persons, which may be softened by a passing cloud, but are always apparent. These shadows go to make up a tremendous proportion of the beauties of both landscape and buildings. It is their absence which makes the depressing monotony of a cloudy day. The actual brightness of the sky is often greater on a day when the sky is entirely overcast with clouds than when the sky is clear, yet the effect is gloomy and forbidding and the landscape is dull and lifeless. Plainly a pleasant illumination depends largely upon contrast between light and shade. These contrasts appear in widely varying degrees in all outdoor scenes, which impress us by their beauty.

A far greater contrast, however, is observed the moment we surround ourselves by the four walls of a room which depends upon natural lighting for illumination. In a rather deep and narrow room, lighted by a single north window at one end, we notice a marked change in the effect of the lighting in different portions of the room. Standing in the room and looking out of the window we find the prospect agreeable or not, according to the scene presented out of doors. The interior of the room is outside our range of vision. Step back a few paces and the outside view shrinks into a scene framed by the window. We notice that the walls adjoining the window appear much darker than the outdoor scene, and indeed they are. Step back a few paces more and the contrast between the sky and the walls surrounding the window becomes more marked, until at length the bright patch of sky, which, viewed from near the window, was not in the least unpleasant, becomes uncomfortably glaring and after a time almost unbearable. Obviously, the sky is no brighter than before, though it appears much brighter. If is plain that our discomfort is due to excessive contrast. This contrast is not only uncomfortable, but effects our ability to see in a most striking and unexpected manner. Let a person stand facing us, immediately in front of the window; his features are all but indistinguishable and to discern fine details is impossible. Now draw a thin shade over the window, just dense enough to reduce the brightness of the sky within tolerable limits, and the features are plainly discerned. The face is obviously receiving less light than before, but is much better lighted. It is quite apparent that even the brightness of the north sky if misplaced may be extremely objectionable.

When we attempt to light this room by artificial means, we encounter degrees of brightness far exceeding any object in nature with the exception of the sun. Each square inch of the incandescent gas mantle gives from 60 to 90 candle power, and the filament of the tungsten lamp 1,200 or more. No one need be told injurious effects of such degrees of brightness. It is a matter of common experience. Yet here, as before, contrast has much to do with our sense of discomfort. Place a tungsten lamp—of any size—between your eyes and a north window. The brightness, though uncomfortable after a time, is by no means blinding. Draw a heavy shade over the window and the discomfort, due to increased contrast, is immediate and intense. Close your eyes, and the long time which the after image persists gives evidence of the actual injury sustained by the retina of the eye. The same experiment upon an incandescent gas mantle will produce similar results, but the after image will persist a comparatively short time, showing that the injury has been less severe.

From these few facts of every day experience and simple experiment we are able to draw the general conclusion that, given sufficient light to see without straining the eyes, and steady, unwavering illumination, the eye can perform its functions easily and comfortably over a tremendous range of conditions, *unless excessive contrasts of brightness fall within the range of vision.*

This last is the most difficult condition to meet.

While there is no test by which a lighting system may be pronounced absolutely innocuous or the reverse, an excellent comparative test may be made without the aid of any other apparatus than a watch. By looking at any source of light for say 2 or 3 seconds, then shutting the eyes and determining the time required for the after image to disappear, the persistance of this after image is a measure of the strain upon the retina of the eye.

We have seen that the whole lighting system is concerned mainly with distribution of brightness. The brightness of a surface depends upon two things:

1. The extent to which the light received by the surface is concentrated.

2. The character of the surface—the amount of light absorbed by it and the manner in which light is reflected from it. A silvered mirror and a piece of white blotting paper absorb light in about equal proportions, but the difference in brightness is tremendous. Viewed at the angle at which the reflection of the light source appears the brightness of a mirror is almost that of the source itself, while viewed from other angles the mirror is dark—the brightness is practically nil. The blotting paper, however, appears of the same brightness from whatever angle it is seen.

Thus there are three essentials to be considered in the lighting of a room:

1. The brightness of visible light sources or their shades must not be of a degree to produce objectionable contrasts.

2. The manner in which light is distributed from the lighting unit must be properly controlled so that surfaces which are desired to be bright shall receive more light than those which are to be darker.

3. Surfaces which are to be bright should be lighter in color than those which are to be darker.

There are an infinite number of ways in which lamps may be arranged and equipped to produce any conceivable effect desired by the user.

In most residences, however, the principle rooms are provided with but one outlet in the center of the ceiling, and I shall now demonstrate some of the more important effects obtained by various arrangements of shaded lights and wall coverings in a room so equipped.

(The demonstration was by models approximating actual conditions.)

Losses by Leakage of Steam.[1]

By R. T. Strohm.

The efficiency of a steam plant cannot be brought to its highest point without looking well to the matter of loss by leakage, particularly the leakage of steam. Every pound of water that is converted into steam and then allowed to escape carries with it more than a thousand heat units, a part of which at least should have been utilized in driving pistons or doing other useful work. A certain amount of leakage of steam is bound to occur in every plant, but it is likely to be unnecessarily large if the proper precautions are not taken to prevent it. The amount of steam that will escape in a given time depends on the size of the leak and the pressure of the steam. Therefore, the higher the steam pressure carried in a plant, the greater is the loss when a leak does occur and the greater should be the precautions taken to prevent such loss.

One of the most prolific sources of loss by leakage is to be found in valves and pistons that have become worn or that are not properly fitted. A certain engineer and designer of steam engines, in speaking of the relative economies of various types of engines, gave it as his conviction that the performance of the steam engine could be made far more creditable by simply taking precautions to prevent leakage, instead of spending so much time, thought and experiment in making changes in the valve gear, the location of ports, and so on. In other words, his statement implied that poor engine performance was not due so much to the effect of the valve gear on the steam distribution as to the effect of preventable waste by leakage.

Leakage of steam from the steam chest past the valve into the cylinder may be detected in different ways. If the leak is of considerable size, enough steam will enter the cylinder after cut-off has taken place to increase the pressure appreciably, and this increase will be manifested on the indicator card by a high expansion line. If the leak is very small, the change in the height of the expansion line will be so small that it cannot be differentiated from the rise due to revaporation. In such a case the indicator should be taken off, the piston moved near to one end of the cylinder and blocked in position. The indicator cock at that end should then be opened and the throttle valve slowly opened until full boiler pressure exists in the steam chest. If the steam valve leaks, steam will escape from the open indicator cock. The same test should be made with the piston at the other end of the cylinder.

A leak past the steam valve is of less consequence than a leak past the exhaust valve, because any steam that enters the cylinder past a poorly fitting valve will give up its energy by expansion in the same was as the steam entering during the admission period. But if the exhaust valve leaks steam escapes from the cylinder before its expansion is completed and thus wastes a part of its energy. To test a slide valve for leakage on the exhaust side the exhaust pipe should be disconnected or a joint broken at some point in the pipe, so as to open it to the atmosphere. Then the engine should be blocked with the piston in mid position and the valve rod should be disconnected from the valve stem. Then, by moving the valve by hand, steam can be admitted to each end of the cylinder in turn and held there. If steam appears at the exhaust when the valve is not in a position to open either port to the exhaust, there is leakage through to the exhaust, either directly from the steam chest or past the exhaust edge of the valve.

If the engine is of the Corliss type, the piston should be set at the middle of its stroke and the engine should be blocked so that it cannot turn. The steam valves should be tripped and closed. The rod leading to one exhaust valve should be disconnected and the other exhaust valve should be set so as to close its port. Steam may now be allowed to enter the cylinder by moving the corresponding steam valve. Then the exhaust valve may be rotated slowly. If there is any leakage past the valve while it covers the port, steam will appear at the open end of the exhaust pipe. The same test should be applied to the other valve.

Piston rings may wear and break, and cylinders may be worn out of round, so that steam will escape from the working side of the piston to the exhaust side. If the leakage past the piston is large, it may be detected by the use of the indicator. The expansion line will fall too rapidly—that is, lie close to or below the theoretical expansion curve. Of course, if the steam valve should leak at the same time and at approximately the same rate, the indicator would fail to show the leak. But it is unlikely that this coincidence will exist. The existence of a leak past the piston may be discovered without the use of an indicator, however. The cylinder head should be removed and the piston blocked in mid-position in the cylinder. The steam valve leading to the head end of the cylinder should be closed and the exhaust valve at the crank end closed. Steam is then admitted to the crank end by opening the steam valve at that end cautiously. If there is any leak past the piston, steam will escape from the open end of the cylinder. The same test should be made with the piston blocked in other positions in its stroke, as the leak may occur at some particular position of the piston. Another way in which steam may leak from the engine is at the stuffing-box surrounding the piston rod, owing to a badly packed rod, poor packing material or a damaged rod. A leak at this point will be manifested by the hiss of escaping steam and by puffs of vapor.

Still another source of loss is leakage from the boiler and the steam pipes, due to bad joints. In the case of steam pipes the leak can be detected by the sound of the escaping steam or by the appearance of the vapor. If there is a leaky rivited joint in the boiler, the steam may escape inside the sitting and be carried away unnoticed in the flue gases. It is possible to test for leakage at the stop valves, pipe joints and other outlets by shutting down all engines and pumps that use steam from the boiler, maintaining the normal pressure for a time, and noting whether there is any change in the water level. As no steam is being used, the water level should remain unchanged. If it falls there must be some escape of steam. In making a test of this kind the pressure must be kept at the usual working point; for the water level always falls when a boiler is banked and the pressure is decreased, because of the natural contraction of the water due to the lowered temperature. When the pressure is maintained the only cause of a lowered water level is leakage. Moreover, the test must be sufficiently long. It will require considerable time for a small leak to affect the water level in a boiler; therefore the level should be noted very accurately at the beginning of the test, and the test should be continued until the existence or absence of leaks is assured. A lowered water level in a test like the foregoing may be due to a leaky blow-off cock. If the blow-off pipe is arranged in such a way that the discharge end can be seen, it is a simple matter to determine whether any water is escaping when the valve is closed. But the blow-off pipe is frequently arranged to discharge into a sewer or some other form of underground drain, and the end of the pipe is hidden. In such a case the cock may be tested for tightness by noting the temperature of the blow-off pipe a short distance beyond the cock. The piping from the boiler to the blow-off cock will be hot, because it contains heated water. The cock itself and the piping directly connected to it will be heated by conduction. But at a distance of a couple of feet from the cock the blow-off pipe should be

1. *Electrical World.*

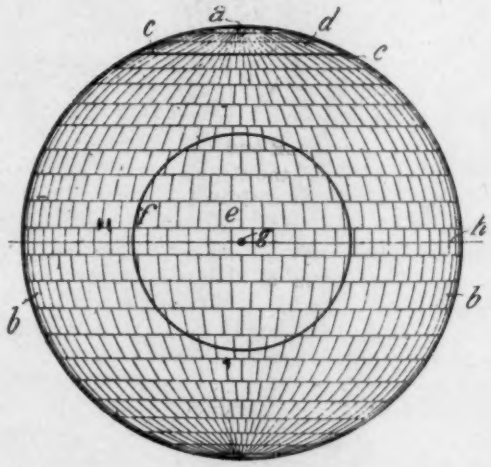
comparitively cool when the cock is closed and not leaking. If there is a leak, the escaping water will make the whole pipe hot.

In many power plants the condensation resulting from loss of heat in the steam pipes is led to a steam trap and is discharged into a hot well or into a feed-water heater. The purpose of the trap is to open intermittenly and discharge the collected condensation, but to prevent the escape of steam, and this is accomplished in a variety of ways, as by floats, buckets, or expansion devices. If, through incorrect adjustment, wear of the valve or failure of any of the parts, the trap is kept open continuously, there will be a steady waste of steam. And if the discharge pipe of the trap cannot be observed readily, the leakage is apt to continue for a long time unnoticed. It is not likely that any one could determine by observing the temperature of the discharge pipe whether water or steam was passing. But it would be possible for an experienced ear to detect, by the sound of the discharge, whether water or steam was escaping.

New Methods and Appliances.

CONSTRUCTION OF GASHOLDER CROWNS.—The Berlin-Anhalsiche Maschineubau-Aktiengesellschaft has taken out English patents on a system of construction in which the segment of the imaginary sphere which is to constitute the crown has for its centre a point on the equator of the sphere, so that the plates form parallel bands or strips, instead of concentric circles or zones as in the usual constructions. By this arrangement the number of plates, and consequently the number of joints required, is reduced, while there is not the waste of material inseparable from the use of trapeze-shaped plates hitherto employed.

Fig. 1.



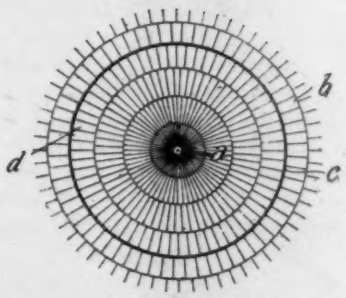


Fig. 2.

Fig. 1 shows a complete sphere in elevation, and Fig. 2 is a plan of the segment adjoining one of its poles from which crowns have hitherto been formed. The advantages of the crown according to the invention, over the known construction, will at once be obvious. Whilst hitherto one pole, *A*, of the sphere, *B*, formed the centre of the crown, *D*, limited by the circle, *C*; the new crown is constituted by plates situated within the circle, *F*. A comparison of Fig. 2 with the portion enclosed by the circle, *F*, in Fig. 1 shows the essential advantages of the invention—namely, a considerable reduction in the waste of metal, and more particularly in the number of riveted joints, so that the cost of manufacture is much smaller than before.

MR. MICHAEL J. HEARNE, well known to meter manufacturers as a meter expert, died at his home in Brooklyn, N. Y., June 22, 1914, and was buried in Woodlawn. Mr. Hearne was a splendid type of workman, and commanded the respect of all who knew him.

Publications.

[All Publications, Catalogues, etc., mentioned below, are kept in our office for the convenience of our patrons.]

Clark Jewel Gas Stoves.—Geo. M. Clark Company, Division American Stove Co. Catalogue No. 91.—Illustrating and describing the complete line of gas stoves, water heater heaters, and small gas appliances, etc. Two new steel cabinets, two new restaurant stoves and new cake bakers are shown. These stoves are distinctive in design and mechanical excellence, being of all steel construction.

Parker-Russell Mining and Mfg. Co., St. Louis, Mo., Builders of Complete Coal Gas Carbonizing Plants.—A booklet containing 32 pages, title—"Progress." A brief outline is given of the progress in gas making, increasing the yield and decreasing the labor, cost and fuel expense. The materials used in the settings and the retorts are fire clay and silica. Illustrations show arches and benches in the course of construction, and the booklet contains diagrams of a discharging-charger and patented standpipe systems. This company will build either complete coal gas carbonizing plants or furnish any portion of the plant.

Supplement to Catalogue C, Eclipse Gas Stove Co., Rockford, Ill., contains 32 pages, standard N. C. G. A. Hand Book size, bound in paper cover. These sheets really supersede some of the sheets in Catalogue C, and should be put in their proper place therein. The new sheets give the 1914 models of the various types of gas ranges, with description. The supplement also contains sheets showing water heaters and domestic service equipment.

Eclipse Hot Blast Hotel Range. Eclipse Gas Stove Company, Rockford, Ill.—A catalogue on Eclipse Hot Blast Hotel Ranges, containing 24 pages. A general description of this type of range is given; illustrations show how it is constructed and how the heat circulates to make this an efficient appliance. The Hot Blast Hotel Range is the last word in hotel ranges. The catalogue also shows several types of restaurant and hotel ranges for short order work.

Northern Cranes.—Northern Engineering Works, Detroit, Mich.—Catalogue No. 26.—Showing traveling and pillar cranes applied to various industries. The description in the catalogue is general. Detailed information will be furnished by the company on application.

Vulcan Appliances.—W. M. Crane Co., New York.—Leaflets on the following appliances: New "Vulcan" bake oven, frankfurter stove, "Vulcan" water heater, direct heater boiler in 5 and 10 gallon sizes, "Vulcan" industrial burners showing various types of burner with consumption up to 300 cubic feet per hour.

Tools and Street Department Requisities.—Bulletin No. 16, *Connelly Iron Sponge and Governor Company, New York.*—This bulletin is devoted to tools and street department requisites. Two pages in the beginning are devoted to street department organization. A detailed description is given of the various tools and equipment used in street work, an outline of the processes of work, and an explanation of how the tools and equipments are used.

Tramrail Systems, Trolleys, Electric Hoists, Catalogue D., 1914. *—The Brown Hoisting Machinery Company, Cleveland, O.*—As noted in the title this catalogue contains data on hoists and conveyors, and varied applications of this apparatus are shown. This apparatus is applicable in gas works for conveying coal, coke, or any material about the works.

Power from Coal.—Electrical Testing Laboratories, New York—A booklet outlining briefly the properties of fuel coal with reference to its heating value for power purposes. It is stated in the booklet that there is a reprint of a government publication, known as "Bulletin No. 339, Series Q, Fuels 10," originally issued by the Department of the Interior, ready for distribution at the office of the Laboratory, copies of which may be had upon application. The booklet states that the laboratory is prepared to make tests and analysis of coal or other fuels.

Calorimetry.—A 39 page booklet, prepared by the American Meter Company of New York. This gives a detailed description of the improved type of Junkers Calorimeter, manufactured by this company. The apparatus described has been improved in accordance with the recommendations of the American Gas Institute, made by the Committee on Calorimetry. The book contains extracts from tests made

by the Public Service Commission, New York, and the American Gas Institute. Aside from the general description of the calorimeter, this booklet is devoted to extracts from reports, specifications and directions for the use of the calorimeter.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,097,757. Gas Producer. E. A. W. Jefferies and J. R. George, Worcester, Mass., assignors to Morgan Construction Co., same place.

1,097,825. Bunsen Burner. J. A. Steele, Cedarville, O.

1,097,834. Gas Meter Testing Device. G. W. Anderson, Galesburg, Ills.

1,098,059. Gas Producer. H. F. Smith, Lexington, O.

1,098,190. Gas Washer. T. W. Stone, Fort Wayne, Ind., assignor to The Western Gas Construction Co., same place.

1,098,272. Gas Range. H. W. Lawrence, Baltimore, Md.

1,098,374. Coke Oven or Gas Furnace. W. Feicks, Bloomfield, N. J.

1,098,412. Apparatus for Generating Gas. F. D. Shaw, Chicago, Ills., assignor to Shaw Kiln Co., Atlanta, Ga.

1,098,534. Method of and Apparatus for Generating Producer Gas. E. Servais, Luxemburg, Luxemburg.

1,098,670. Automatic Cut Off for Gas Burners. H. S. Leinss, New York City.

1,098,875. Gas Producer. A. J. Bassett, Milwaukee, Wis., assignor to Sharp-Basset Gas Producer Co., same place.

1,098,900. Process of Obtaining Ammonia from Gas. G. Hilgenstock, Dahlhausen-on-the-Ruhr, Germany.

1,099,098. Process of Obtaining By-Products from Gases Resulting from the Dry Distillation of Coal, etc. G. Hilgenstock, Dahlhausen-on-the-Ruhr, Germany.

1,099,256. Closure for Retort Coke Ovens. H. Koppers, Essen-on-Ruhr, Germany, assignor to H. Koppers Co., Chicago, Ills.

1,099,257. Cupola Gas Generator. H. Koppers, Essen-on-Ruhr, Germany, assignors to H. Koppers Co., Chicago, Ills.

1,099,447. Pyrophorous Gas Lighter. J. Kellermann, Berlin, Germany.

1,099,481. Gas Burner Mechanism. J. B. Anderson, Shaler township, Allegheny County, Pa.

1,099,511. Gas Lighter. L. Ott, Harrisburg, Pa.

1,099,639. Apparatus for the Manufacture of Coal Gas. R. C. Congdon, Atlanta, Ga.

1,099,773. Apparatus for Purifying Gas. H. F. Smith, Lexington, O.

1,099,829. Gas Burner. A. F. Thompson, Huntington, W. Va.

1,099,848. Vapor or Gas Generating Apparatus. W. F. Dunlop, New York city.

1,099,876. Gas Furnace. A. E. Hall, Oakland, Cal., assignor to Hall Furnace Co., same place.

1,099,932. Rupture Preventing Structure. F. Peiter, Cleveland, O., assignor to The Gas Machinery Co., same place.

1,100,074-75. Gas Producer. J. A. Herrick, New York city.

1,100,171. Method of and Apparatus for Sampling Gases. E. W. Brown, Elyria, O.

1,100,231. Device for Indicating Naphthalene in Illuminating Gas. E. Sainte-Claire Deville, Paris, France, assignor to Societe du Gaz Paris, same place.

1,100,434. Gas Lamp. G. Keith, London, England, assignor of one-half to J. Keith, same place.

1,100,471. Attachment for Incandescent Lights. J. A. Burkley, Pittsburgh, Pa.

1,100,690. Gas Lighter. G. Meyer, Saugerties, N. Y.

1,100,727. Controlling Device for Gas Lamps. E. Goepper, Mulheim-on-the-Rhine, Germany, assignor to Deutsche Gasgluhlicht Aktiengasellschaft (Auergesellschaft), Berlin, Germany.

1,100,883. Watts-per-Candle Photometer. H. E. Ives, Mount Airy, Pa., assignor to The United Gas Improvement Co., Philadelphia, Pa.

1,100,936. Gas Lighter. J. L. M. Zimmerman, Philadelphia, Pa.

1,100,941. Gas Generator. D. D. Barnum, Worcester, Mass.

1,101,225. Gas Regulating Valve. H. E. Wolf, Webster Groves, Mo.

1,101,233. Gas Burner. E. B. Babcock, Seattle, Wash.

1,101,279. Water Back for Gas Stoves. A. Heagele, Brooklyn, N. Y.

1,101,477. Means for Utilizing the Residual Heat of Coke Produced in Vertical Gas Retorts. H. J. Toogood, Elland, England, assignor to R. Dempster & Sons, Limited, same place.

Items of Interest
FROM VARIOUS LOCALITIES.

AN electric clock with a dial 8 feet in diameter, a huge time piece with numerals so large that it will be possible for persons to read the time for many blocks on either side of it, is to be erected by the New Bedford Gas & Edison Light Company on its new office building at Purchase and Spring streets, New Bedford, Mass., to fill the gap caused by the removal of the old "town clock" from the tower of the North Congregational Church, when that structure was altered for the widening of Purchase street. The clock will project from the fourth story of the Company's handsome new building, and in this location will be visible for many blocks north and south.

THE Riter Conley Mfg. Co., has a force of men at work making the extensive additions and improvements to the plant of the Worcester Gas Light Company on Quinsigamond avenue, Worcester, Mass. For about two years building operations have been under way at the big plant, commencing with the erection of the big steel gas holder. It will require many more months before all the new buildings and extensive improvements are completed.

PLANS for the new building for the Marshalltown plant of the Iowa Railway and Light Company, and for the rebuilding of the Company's boiler house, have been prepared and are now being submitted to contractors for bids. The Company expects to be able to let the contract for both buildings in a week or two.

ORDERS have been placed and the material is on the way with which to rebuild the benches in the gas plant of the Birmingham (Ala.) Railway, Light and Power Company. The rebuilding of the coal benches is the initial step in the complete remodeling of the gas plant. The preparations of the Company to remodel the plant seems to indicate that the Company has abandoned definitely the by-product gas proposition. It was stated by Manager J. H. de Windt at the final gas conference with the City Commissioners, that the gas plant would be rehabilitated unless by-product gas was introduced.

THE honorary degree of Doctor of Laws was conferred upon General Geo. H. Harries, President of the Louisville Gas and Electric Company, Louisville, Ky., by President Barker of the University of Kentucky, at its 46th annual commencement, at Lexington, June 4th. President Barker, in conferring the degree, referred to General Harries' military career and concluded with complimentary allusions to the work accomplished by the Louisville Gas and Electric Company and "the fine public-service spirit which has been made apparent in the organization and conduct of the company—a high example worthy of complete imitation and all commendation.

THE Consolidated Gas, Electric Light and Power Company, Baltimore, Md., must secure a traders license for each of its stores in the county. The gas company, acting on advice, secured but one license, covering the value of the stock in all of its stores. In order to have the matter judicially decided, State's Attorney George Hartman filed a complaint against the company of trading without a license, and Judge Harlan's decision sustains Mr. Hartman's opinion. The case will be appealed.

THE Reliance Gas Mantle Company, a corporation organized under the laws of the State of Delaware, announces that its capital stock has been reduced from $100,000 to $20,000 by reducing the par value of of the shares from $10 each to $2 each, said reduction being made by the written consent of stockholders representing more than two-thirds of the capital stock of said company.

PRESIDENT J. H. BREWER, of the American Public Utilities Company, announces that the name of the La Crosse (Wis.) Gas and Electric Company has been changed to the Wisconsin-Minnesota Light and Power Company, and will acquire all of the property of the Chippewa Valley Railway, Light and Power Company. The American Public Utilities becomes the owner of all of the common stock of the new Wisconsin-Minnesota Company, and with the acquisition of this property virtually is in control of all the public utility field on both sides of the Mississippi Valley from La Crosse to St. Paul. Of the Wisconsin-Minnesota Company's authorized capitalization there will be outstanding $1,700,000 seven per cent. cumulative pre-

ferred and $988,000 common stocks. The authorized bond issue is $20,000,000, of which $3,750,000 has been issued. Kelsey, Brewer & Co., of Grand Rapids, Mich., the dominating factors in the American Public Utilities Company, brought about the merger and will manage the newly acquired properties.

ATTORNEY GENERAL BOYNTON, of Massachusetts, has ruled in a decision given to the house of representatives that the State legislature has the right to reduce the price of gas in the city of Boston, notwithstanding claims made by the Consolidated Gas Company that the sliding scale act of 1906 constituted a contract which could not be evaded except by the consent of the companies. The question was given the attorney general because of pending legislation seeking to reduce the price of gas in Boston from 80 to 70 cents.

THE Utica (N. Y.) Gas & Electric Company has filed with the Public Service Commission of the second district, an acceptance of the order of the Commission requiring it to reduce the price of gas in Utica to $1.10 per 1,000 cubic feet after July 1, 1914, and to $1 after July 1, 1916.

THE electric and gas rates question, which has been disturbing the peace and harmory of the Red Oak, Ia., populance, has at last been settled permanently and without being taken into the federal court. The city council and the companies have agreed upon these rates: Twelve cents per kilowatt hour for the primary rate, 10 cents for the secondary rate, and 5½ cents excess rate. A census of the lights of every customer in the city will be taken, the work having been begun already. The rate which has been established for the Red Oak Gas Company is $1.70 for the first 1,000 cubic feet, $1.55 for the next 3,000 cubic feet, and $1.45 per 1,000 for any amount in excess of 4,000 cubic feet.

THE Old Colony Gas Company has entered into competition with the electric light company to furnish the lights for the Whitman, Mass., white way. A proposition will be submitted at the meeting to be held by the Merchants Association.

ARTIFICIAL gas for Vincennes, Ind., instead of natural gas which has been intermittent in pressure for a good many months of late, is the proposition which the Vincennes Gas Company has under consideration. A movement is on foot for a reorganization of the local company, looking forward to the erection of a new artificial gas plant. To do this, $75,000 must be raised, and it has been proposed that the bondholders of the local company turn in securities and take preferred stock as a means of raising this money.

THE City Council of Lebanon, Pa., are advertising for bids for extending its street lighting system. The lights are to burn from dusk to dawn on an average of 4,000 hours per year, on a 3 year contract. The bid is to fix a price per annum for individual ornamental posts with the most modern Welsbach Lighting Company attachments and to be not less than 250-candle power at any time. General Manager George S. Speaker of the Lebanon Gas and Fuel Company, says he is sure the councilmen will be satisfied with the reasonable rate that will be offered in his bid.

MR. MANNING TUTTLE, of the Springfield (Mass.) Gas Light Company has received notice from the Commissioners of Patents through his Washington attorneys that he has been granted a patent on a device for locking gas cocks.

THE Gas Machinery Company, of Cleveland, O., is furnishing the Citizens Gas & Electric Company, of Stroudsburg, Pa., a new 5-foot generator for their present 4-foot water gas set. The new generator when installed together with the reverse steam connections recently furnished the Stroudsburg Company will increase the capacity of their machine very materially which has been made necessary on account of the added consumption of gas in Stroudsburg.

THE East Boston gas bill which has passed both branches of the Massachusetts Legislature and is now before Gov. Walsh for his approval or disapproval is a short act of less than 60 words as follows:

"The price of gas furnished to consumers in that part of Boston known as East Boston for purposes of lighting, heating and cooking shall not exceed 80 cents for every 1,000 feet. Violation of the provisions of this act shall be punished by a fine of not less than $5 nor more than $500 for each offence.

The present gross price in East Boston is 85 cents with average price 83.4 cents. The gas engine and fuel rate, first 10,000 cubic feet is 85 cents per thousand; next 20,000 feet, 80 cents; next 20,000 feet, 75 cents; next 50,000 feet, 70 cents; all over 100,000 feet, 65 cents. A discount of 30 per cent. is allowed in excess over $200 of bill. A minimum charge of 50 cents a month is made with refund if consumers' bills amount to $6 per year.

The average price received for gas in various cities of the state according to the last annual report of the gas commission follow:

	Cents.		Cents.
Boston	79.8	Lynn	72.9
Cambridge	85.6	Malden	90.1
Charlestown	85.6	New Bedford	81.2
East Boston	83.4	Newton	89 5
Fall River	81.3	Springfield	84.8
Haverhill	87.1	Worcester	78.1
Lowell	86.1		

MR. N. P. ZECH has been elected Comptroller of The Atlantic Gas & Electric Company, of New York, which controls a number of public utility properties in the eastern States. For the past 10 years Mr. Zech has been Auditor and Treasurer of the syndicate properties controlled by H. M. Byllesby & Co., of Chicago, being in charge of the Statistics as well as the auditing and accounting of all the subsidiary companies.

AT a meeting of the Board of Directors of the Enterprise Gas Company, Egg Harbor City, N. J., Mr. F.W. Bergmann was elected Secretary-Treasurer to fill the vacancy caused by the resignation of Mr. F. Schuchardt, who has held the position since the institution of the Company. Mr. Bergmann, who has conducted a clothing manufacturing establishment for many years, has decided to give up his factory in order that he may give his entire time to the new position, which also means the Secretary-Treasuryship of the Atlantic County Electric Company.

MR. MORRIS W. STROUD, President of the American Gas Company has been elected a Director of the Eastern Power and Light Corporation.

THE Norfolk County Gas Company of Virginia has filed amendments to its charter increasing its capital stock from $25,000 to $100,000 and extending its franchise.

A GAS and electric company, headed by E. C. Dillon and associates, has applied to the City Commission of Huntsville, Ala., for a franchise to serve that city with manufactured gas at $1.25, or natural gas at 75 cents, and hydro electric power at from 6 to 10 cents per kilowatt. The Company will derive its natural gas from the wells in West Huntsville and its electricity from Hale's Bar on the Tennessee river. The franchise will be granted as soon as legal formalities are complied with. This means sharp competition in electric power at least, as the Alabama Power Company already has a franchise.

AT the end of 1913 the number of gas lamps in Paris was 56,088, and that of electric arcs 2,370. Of the gas lamps 2,036 are flat flame, 51,625 upright incandescents, 1,154 small inverted incandescents, and 1,243 high pressure incandescents. This last number will soon be raised to 2,800, and there is a scheme on hand to light by high pressure gas all the principal thoroughfares not at present lit by electricity. In electricity, the principal changes have been the substitution of Bardon-Carbone lamps for the former ordinary arcs, 2,070 in number, and the increase of the number of electric arcs by 300. In Berlin the lengths of street lit by the different methods were, in 1913, as follows: Upright gas incandescents, low pressure, 252½ miles; inverted gas incandescents, low pressure, 13½ miles; inverted gas incandescents, high pressure, 51½ miles; electricity, 17½ miles. The number of each kind of lamp in Berlin is: Upright incandescents, low pressure, 19,375; inverted incandescents, low pressure, 890 ordinary and 1,362 intensive; high pressure upright incandescents (405 to 2,160 candles), 386; high pressure inverted incandescents (1,800 and 3,600 candles), 3,970; arc lamps (360 to 3,600 candles), 896; metallic filament lamps (45 to 180 candles), 324.

Utilities Commission News.

COMMISSIONS CO-OPERATE IN ACCOUNTING.—Every utility plant in Missouri, including municipal plants, are to have a uniform system of bookkeeping and accounting. A joint conference was held at Jefferson City between the State Public Commissions of Missouri, Illinois and Wisconsin for the purpose of adopting a uniform system of keeping accounts on the part of gas, water, electric and heating companies. Ex-Governor Richard Yates of the Illinois commission conferred with the Missouri commission. Three general committees were appointed, one headed by P. J. Kealy of the Kansas City Railway and Light Company, on depreciations; one by Hugh Wurtlack of the St. Louis Light and Development Company, on historical day, and the third by Edwin Gruhl of the St. Louis Union Electric Company on classification of utility companies.

CANNOT COMPEL COMPANY TO EXTEND SERVICE.—(Maryland). A public service corporation such as a water supply company cannot be required to extend its plant into additional territory when the revenue from such service will not pay the cost of the extension and maintenance of the service, and the corporation has not funds to pay therefor. and cannot sell bonds for that purpose, so that an order of the Public Service Commission requiring it to make such extension is unreasonable.—Public Service Commission of Maryland vs. Brooklyn & C. B. Light and Water Co.

GENERAL MORRIS SCHAFF, whose term as a member of the Massachusetts State Board of Gas and Electric Light Commissioners, ends July 1, is headed for a reappointment, and those who have been hinting quietly that it might be well to get a younger man in the place of the General need not waste much of their time and energy. The General has been one of the members of this board for years. He was never found playing the game of the interests, and the fact that much of the teamwork now evident on the board was brought about through his agitation is operating well to his advantage at this time.

ASKS TO CHANGE RATES.—The Quincy (Ills.) Gas, Electric and Heating Company has asked for authority to change its gas rates, for the reason that the present schedule has caused much confusion owing to the public not being able to understand the step rates. It is also the desire of the company, it is pointed out, to create an industrial rate with the intention of attracting to its line of mains the larger industrial consumers and the present schedule does not go low enough to obtain this business.

TO BUY EMPIRE GAS AND ELECTRIC STOCK.—The Public Service Commission, 2d District, New York, has authorized the Empire Coke Company to purchase $100,000 of common stock of the Empire Gas and Electric Company for $90,000. The Coke Company has also been given permission to issue $35,000 of its capital stock, to be sold at not less than par, the proceeds together with $54,100 cash, to be used for the purchase of the stock of the Empire Gas and Electric Company.

MINIMUM CHARGE JUST.—In a report filed with the Ohio Public Utilities Company, Charles V. Critchfield, Gas Expert of the Commission, recommends that the Union Gas and Electric Company be authorized to put into effect a minimum charge of 60 cents a month to gas consumers, or the equivalent of the consumption of 2,000 cubic feet of natural gas a month. In approving a minimum charge, he says: "The burden of carrying an investment requisite to meet the capricious demands of an occasional consumer must be borne in some proportion by every other sizable consumer."

THE Public Service Commission, of Maryland, acting on the advice of its chief counsel, has decided that a deposit by a prospective consumer required by the Gas, Electric Light and Power Company is valid. The point was raised by an applicant who declined to conform to the company's rules in making a deposit with the company before the installation of a gas meter.

RECEIVER'S INCREASE SUSPENDED.—The New Jersey Commission has issued an order suspending an increase in the rates for gas and electricity by the Newton Gas & Electric Company, and ordered a public hearing to consider the reasonableness of the proposed increase. The Company, which has been in the hands of a receiver since 1910, claims that the increase is essential for proper service and to meet its expenses, and that the year 1913 shows a deficit of $14,000.

Financial Notes.

THE Secretary of States Department, Austin, Tex., has approved and filed an amendment to the charter of the Amarillo Gas Company of Amarillo, increasing its capital stock from $50,000 to $150,000.

THE Cities Service Company publishes this statement as of February 29th, 1914:

Assets.	
Plant and investment	$45,438,794.29
Treasury stock—42,186.20 shares common stock	1.00
Undelivered securities due on contract	1.00
Earnings due from sub cos	5,256,118.05
Bills and accounts receivable	4,558,231.42
Coupons receivable	169,762.29
Dividends receivable	40,034.00
Interest receivable	142,060.74
Cash	168,259.54
Total assets	$55,773,262.33
Liabilities.	
Preferred stock	$27,368,426.00
Common stock	20,000,000.00
Five-year 7 per cent. notes	5,000,000.00
Contracts	850,001.00
Expenses accrued in advance	17,827.40
Dividend accrued	28,227.84
Int. accrued 7 per cent. notes	58,333.34
Surplus	2,450,446.75
Total liabilities	$55,773,262.33

Income account, year ended February 22, 1914: Gross earnings $2,657,931, expenses 86,690, net earnings $2,571,241. Deductions: Interest on notes $181,396, preferred stock dividends $1,055,510, common stock dividends $556,408; total $1,793,314; balance surplus $777,927.

THE American Gas Company has been making excellent gains in receipts this year. For the four months ended with April the combined operating revenues of the affiliated corporations showed a gain of $183,137, or 17 per cent., as compared with the corresponding period last year.

THE Boston Consolidated Gas Company has reduced its dividend from 9 to 8 per cent. Owing to the advance in the cost of labor and material, especially the cost of gas oil, it was found that the net earnings for the year ending June 30, 1914, would not be sufficient to pay the rate of dividend the company is entitled under the so-called Sliding Scale act of 1906. By the terms of this act the company is allowed to pay 1 per cent. additional in dividends for every 5 cent reduction made in the price of gas, so that the company has a strong incentive to keep the price of gas as low as possible, and the price of gas has been successively reduced from $1 to 80 cents per 1,000. At the rate of dividend paid for the present year the price of gas according to the Sliding Scale act should be 85 cents per 1,000 cubic feet. The directors, however, believing that the unfavorable conditions might be only temporary, decided not to ask the gas-consuming public to share the increased cost by advancing the price of gas as contemplated by the terms of the Sliding Scale act, but to ask the stockholders to assume the full burden by accepting a reduction in their dividends.

THE trustees of the Massachusetts Gas Co., have declared a dividend of 5 per cent. on the common stock, payable in quarterly installments through the coming fiscal year, in accordance with their usual policy. The subsidiary companies report for 11 months to May 31, $2,332,997, as compared with $2,598,434 a year ago. The fairly favorable comparison with a year ago has been made possible by the operations of the coal department, the gas department showing $193,210 decrease from the figures of last year. The falling off in the earnings of the gas companies is reflected in the reduction in the dividend rate on Boston Consolidated Gas fron 9 to 8 per cent. per annum, which means a reduction of over $150,000 per annum in the income of Massachusetts Gas.

THE Canadian Blaugas Company, Limited, of Montreal, have placed with the Davis & Farnum Mfg. Company, of Waltham, Mass., a contract for a single lift gasholder resting in a steel tank. The holder to have a capacity of 50,000 cubic feet and to be erected at their plant at Cote St. Paul, Montreal, Canada.